



PICTURE TAKING
AND
PICTURE MAKING

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PICTURE TAKING
AND
PICTURE MAKING.



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INTRODUCTORY.

This little volume will not tell everything about photography. It will trouble the reader with few technicalities and no theories. In it we shall simply endeavor to start the amateur in the right direction. His own ambitions, tastes and energies will guide him afterwards.

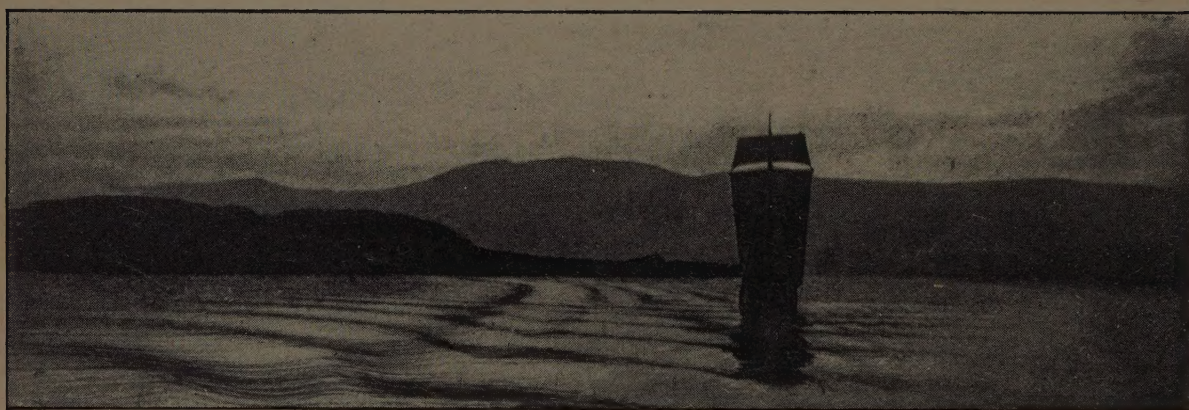
Frankly, we shall recommend our own goods in the chapters on apparatus, etc., which are to follow. Years of experience have given us ideas as to how a camera should be made so that it will be best adapted to the amateur's use. In these pages we give to you the results of that experience; in our work shop we build Kodaks in accordance with the ideas this experience has given us. This book and our manufactures are, therefore, in perfect harmony.

We do not, however, confine ourselves to goods of our own make, full directions, for instance, being given for working the Carbon, Gum Bi-chromate and plain paper processes, none of which use our goods. The other directions for the use of standard goods apply to those of other manufacturers as well as our own.

Some of the instructions herein given will already have been read in our manuals by the Kodak owners, yet it is necessary to repeat them for the benefit of those who have not yet made a photographic start, but at the same time the book will contain much information not to be obtained from a mere manual.

We have no new theories to expound, no old ones to harp on. The excuse for this little book is that it has been asked for. We hope that it may open the road to photographic success for many ambitious beginners. It does not attempt to do more.

EASTMAN KODAK CO.



Kodaked by Andrew Pringle.

THE CAMERA.

FILMS OR PLATES.

Upon the selection of the first instrument much depends. And in advising we must take into consideration the personality, tastes, and pocketbook of the beginner. Yet one rule can safely be laid down. Unless the camera is never to be taken more than a hundred feet from the dark room it must use film. In other words, an exclusively plate camera is all right for gallery work but is a thing to be avoided by the amateur.

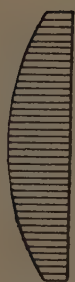
Films in light-proof rolls weigh only one twentieth as much as glass plates and the necessary plate holders; they are non-breakable, are as easy to develop as plates and in rapidity and quality equal the best plates made.

For convenience it is well to have an instrument that will use plates as well as film, although the plate outfit will rarely be used in journeying but is desirable when one wishes to make an exposure or two in or about the house.

LENSES.

Lenses commonly used in hand cameras may be divided into three classes, "Single," composed of one piece of glass, "Single Combination" (sometimes also called simply "Single"), composed of crown and flint glass, and "Double Combination" (often called simply "Double") consisting of two single combinations.

SINGLE LENSES



Plano-convex.

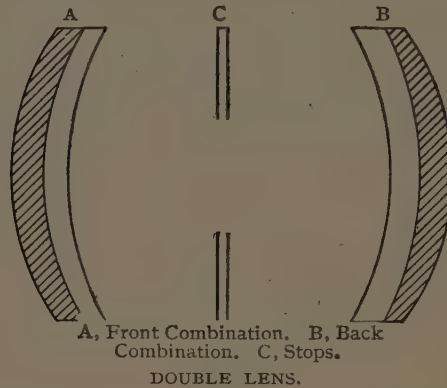
are made in two forms, meniscus and plano convex. The meniscus form, giving the best definition, is always employed except in the cheapest class of cameras. These lenses are always mounted behind the diaphragm which controls the amount of light to be admitted



Meniscus.

DOUBLE COMBINATION LENSES

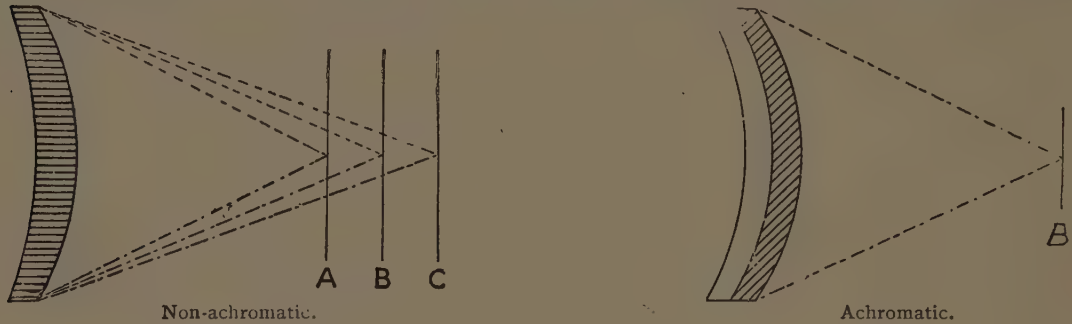
are usually of the form shown in the cut and consist of two



meniscus lenses mounted with the diaphragm between.

CORRECTED LENSES.

All glass, when ground into lenses, has the quality of dispersing the different colored rays so that they will not focus at the same



point. The rays which act on the sensitive surface are those from the violet end of the spectrum and are called the actinic or chemical rays. The visual rays are from the red end of the spectrum, hence if these rays are separated by the lens the image we see on the ground glass is not the one which will make the picture. Fortunately flint and crown glass have different dispersive powers and, therefore, one can be made to correct the action of the other. Hence if we assume that with a non-achromatic lens, such as shown in the cut, the visual focus would be at C, the chemical focus would be at A. Flint glass bends the chemical rays more than does crown glass, and so by combining a negative lens of flint glass with

a positive lens of crown glass, the chemical and visual rays are brought into coincidence, *i. e.*, are brought to focus in the same plane as at B. The lens is then called "achromatic."

In a non-corrected lens even the chemical rays do not all focus at one point but in small lenses the dispersion may be so slight as to be impossible of detection in the picture by the naked eye.

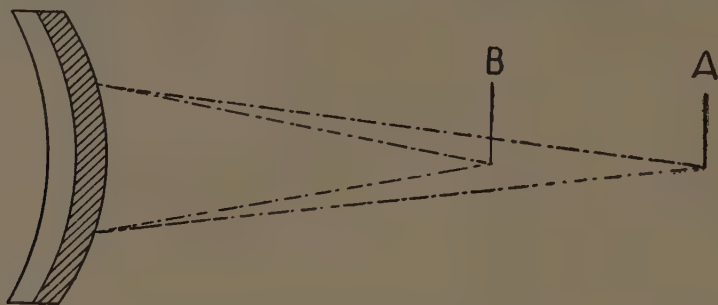
The difficulties of lens making increase, one might say, in geometrical ratio to the size of the plate to be covered and many forms of lenses other than those shown have been devised to overcome these difficulties, some of which employ as many as six or eight pieces of glass, but these lenses have really no practical advantage over the simpler forms in such sizes as are commonly used in hand cameras and we shall, therefore, not consider them here.

In very small cameras the best lens is the simplest; for instance, the lens used in the original Pocket Kodak is a single meniscus non-achromatic and probably no lens ever had higher encomiums showered upon it. The reason being that it was carefully made, rigidly inspected and tested, and not over taxed. As a matter of fact, no double achromatic lens could be made that would surpass it in brilliancy or covering power. For larger sizes lenses must be corrected but there is no advantage in a double lens unless $3\frac{1}{4} \times 4\frac{1}{4}$ or 4×5 , or larger, pictures are desired. Single lenses tend to slightly curve the marginal lines of the picture, but this is unnoticeable in small pictures and is unobjectionable in view work of any size unless the pictures contain architectural subjects. Double lenses can be worked with a larger stop opening than single lenses and are, therefore, quicker, especially in the larger sizes. They are almost essential for 5×7 snap shot work and are preferable for $3\frac{1}{4} \times 4\frac{1}{4}$ and 4×5 , but below that the advantage disappears.

Everything depends on the quality of the work put into a lens. Differences of curve or polish not to be detected except by an expert often constitute the difference between a good and poor lens and only those which have been through the most rigid inspection and trial should be put in a camera by the manufacturer.

“FIXED FOCUS”

lenses are so often mentioned in catalogues and advertisements that the impression has gained ground that this is some distinct kind of lens, with the extraordinary power of focusing all objects near and far in one plane. There is no inherent quality in any lens that makes it “fixed focus”; it is such when it is immovable and that is all. Any lens can, therefore, be made “fixed focus” but the extent to which it will focus all objects in one plane depends upon its length of focus and size of stop or diaphragm used, and upon that only.



The reason for this is that the rays of light from near and far objects do not focus at the same point. For instance, in the above exaggerated diagram we will assume that B is the point at which objects one hundred feet distant will focus and that A is where objects 10 feet distant will focus. Now the distance between A and B will vary in ratio to the focal length of the lens. In a lens of 3 inches focus it is ascertained mathematically to be $\frac{3}{16}$ of an inch and in one of 12 inches focus, $1\frac{1}{4}$ inches. Hence if using a 3 inch focus lens the sensitive surface is placed between A and B the object at 100 feet and beyond (all objects beyond 100 feet come practically within one focus) and objects 10 feet distant will none of them be more than $\frac{3}{32}$ out of focus, which, with the size of stop ordinarily used for snap work, creates so slight a blurring of the image that it cannot be detected. Experience has shown that the limit of focus for a lens which is to be employed for snap shot work with the focus fixed is under 5 inches; in other words that a $3\frac{1}{2} \times 3\frac{1}{2}$ plate is about the largest that can be used to advantage under such circumstances. It is probably true that for cameras of this size and under, nothing can be gained by having the focus adjust-

able and that, on the other hand, better average results will be obtained with a fixed focus, owing to the fact that there is no adjustment that will allow the lens to be put out of focus by a mistake in measuring distances.

“HAND” AND “VIEW” CAMERAS.

Barrels of good ink have been wasted over the comparative merits of “hand” and “view” cameras—we use the word “view” camera in the common acceptance of the term, meaning a bulky instrument that can only be used on a tripod—but this question need no longer be argued. It has answered itself and the view camera has been placed in the attic alongside the muzzle loading shot-gun and the “Ordinary” bicycle. Of course it is frequently desirable to make time exposures, in which case the hand camera must have some solid support, but it is so compact that this support is usually easily obtained. A table, a chair, a fence post or a stump are frequently pressed into service on these occasions, though a tripod may be used when desired. The hand camera is cheaper to operate than the large view instruments and if it has a good lens it will make pictures so clear and sharp that the gems of the collection can readily be enlarged to any size—and with the Bromide papers now made such enlargements are wonderfully artistic, rivalling in beauty the softest etchings. Let the camera, then, be small enough so that it can be carried without inconvenience. If for use on a bicycle the folding style is especially recommended in the 4 x 5 and 5 x 7 sizes, while for the 3½ x 3½ fixed focus cameras the “box” form is very desirable.

A good finder for locating the view is essential on a hand camera and the shutter should be simple and accurate, capable of making snap shots or time exposures *and fitted with a set of stops*, the importance of which will be seen further on.

With these hints the amateur should be able to select an instrument suitable to his wants, bearing in mind that the better he buys the greater will be his satisfaction, although we do not for

one moment advocate his putting a fifty or one hundred dollar lens on his camera until by experience he is sure that he knows just what he wants. The lenses used by leading manufacturers will give perfectly satisfactory work—such work in fact that the user of one will often eclipse in the results he obtains the work of another amateur with a more expensive outfit. It has been our aim to be intensely practical, never putting a dollar of expense into a camera that did not give full value in effectiveness or added convenience, and on the other hand, never building an instrument so cheaply as to impair its efficiency.

GET ACQUAINTED WITH THE CAMERA.

“How shall I load it?”

The camera obtained, that is the first question which will be asked by ninety-nine people out of one hundred, and our answer is, “Don’t load it ; at least, not until you fully understand its workings.”

Try the shutter first, working it several times for both time and instantaneous exposures and making yourself perfectly familiar with its action. Also take careful note of the diaphragms or stops and observe how with the larger opening a greater quantity of light passes through the lens in a given time and you will then fully understand why we use the largest opening for snap-shots and the smaller ones for time exposures.

Having mastered the shutter and the focussing arrangement, if there is one on your camera, and having obtained a slight idea of the conditions necessary for successful picture taking, the camera may be loaded.

LOADING THE CAMERA.

On the supposition that you have taken the advice given in the previous pages and purchased a film camera, we will first give you a few hints about loading with film.

WITH FILM.

With a Kodak this operation is performed in daylight and is very simple. The film is put up in light-tight rolls and extending the full length of the strip of film and several inches beyond each end is a strip of black paper, which, in connection with the flanges on the spool, forms a light-proof cartridge.

FILM
CARTRIDGE.

After inserting the spool and threading up the black paper the camera is closed and the key turned until the black paper has been reeled off and the sensitive film brought into place in the focal plane. The black paper runs with and behind the film, and at proper intervals is marked in white with the number of the section of film, 1, 2, 3, etc. In the back of the camera is a small red window through which the figures appear as the key is turned. These figures show just how far to turn the key and how many exposures have been made. After all the exposures have been made, a few extra turns of the key entirely covers the film with black paper and the camera may be unloaded in daylight.

It is all as simple as threading a needle (simpler for a man) and with each camera is a manual telling plainly about each step. The amateur must bear constantly in mind, however, that the black paper must be kept tightly rolled about the film all of the time until it is in place in the camera and the camera closed, for should the film be exposed to daylight for even a hundredth part of a second its ruin would be accomplished.

In the $3\frac{1}{2} \times 3\frac{1}{2}$, $3\frac{1}{4} \times 4\frac{1}{4}$, 4×5 and 5×7 sizes Film Cartridges may now be obtained for "Double-Two," six or twelve exposures. The "Double-Two" cartridges contain four exposures, so arranged, however, that two of them may be removed after exposure, or, if desired, the entire four exposures may be made before taking out cartridge.

THE CAMERA. WITH PLATES.

For loading with glass plates a dark room is essential, that is, a room from which all white light has been excluded as described on page 47. Provide also a dark room lamp, a camel's hair brush and a shelf or table on which to work. Remove the dark slides from the plate holders and, having closed every avenue for the entrance of white light and lighted the dark room lamp, open the box of plates by running a thin knife blade around the edge of the box.

Take one of the plates from the box and put it in the holder face up, handling the plate by the edges. (The face is the dull side.) Dust with the camel's hair brush and insert the dark slide with the word "exposed" next the plate. Now turn the holder over, if it is a double holder, and load the other side in a similar manner. When all the plate holders have been filled close up the remaining plates in the box, wrap them up securely or put away in a dark drawer.

Daylight may now be admitted to the room and the first step in picture making taken.

MAKING THE EXPOSURES.

SECTION 1. SNAP SHOTS.

Instantaneous exposures, or "snap shots," as they are more frequently called, are usually made while the camera is held in the hand and are about the first thing that the amateur attempts. Some learned writers deprecate this, but as snap shots are the simplest exposures to make and ordinarily the simplest to develop, because most likely to be correctly timed, we believe the amateur should begin his photographic career with this class of work.

Before making an exposure, either time or instantaneous, be sure of four things :

First—That the shutter is set properly.

(For time or instantaneous exposures as desired.)

Second—That the proper stop is in position before the lens.

Third—That an unexposed section of the film is turned into position, or that an unexposed plate is in position and that the dark slide has been removed.

Fourth—Unless the camera has a fixed focus see that it is properly focused on the *principal object* to be photographed.

To take instantaneous pictures the object must be in the broad, open sunlight, but the camera should not. The sun should be behind the back or over the shoulder of the operator.

NOTE :—Effective pictures may frequently be made by working toward the sun, shading the lens to keep out direct sunlight when so doing, but the amateur should not attempt such work at the start.

SET THE FOCUS.

Set the focus by placing the pointer over the figures on the index plate nearest the estimated distance of the *principal object* to be photographed *in feet*.

It is not necessary to estimate the distance with any more than approximate accuracy. For instance, if the focus is set at 25 feet, (the usual distance for ordinary street work) the sharpest part of the picture will be the objects at that distance from the camera, but everything from 15 to 35 feet will be in good focus. For general street work the focus may be kept at 50 feet, but where the *principal object* is nearer or farther away the focus should be moved accordingly.

USE THE PROPER STOP.

It is imperative that a large stop be used in making snap shots. With most cameras the *largest* stop must be used under ordinary conditions with bright sunlight. This is the case with all of the single lens Kodaks. With the double lens fixed focus Kodaks the No. 16 stop should be used and with the double lens 4 x 5 and 5 x 7 Kodaks use No. 8 stop. See page 18.

This size stop *must* be used for snap shots except where the sunlight is *unusually* strong and there are no heavy shadows, such as views on the water, or in tropical or semi-tropical climates, when the next smaller stop may be used.

The smallest stop must never be used for snap shots or absolute failure will result.

LOCATE THE IMAGE.

Holding the camera steadily, locate the image in the finder. The finder gives the exact scope of view and shows on a reduced scale just what will be in the picture—no more, no less.

HOLD IT LEVEL.

The camera must be held level.

If the operator attempts to photograph a tall building, while standing near it, by pointing upward (thinking thereby to centre it) the result will be similar to Fig. 1.

This was pointed too high. This building should have been taken from the middle story window of the building opposite.

The operator should hold the camera *level*, after withdrawing to a proper distance, as indicated by the image shown in the finder. Some cameras are equipped with a rising and sliding front to assist in taking in the tops of tall buildings, etc. See page 28.

All being in readiness

Hold the Camera Steady,
Hold it Level and
Make the Exposure.

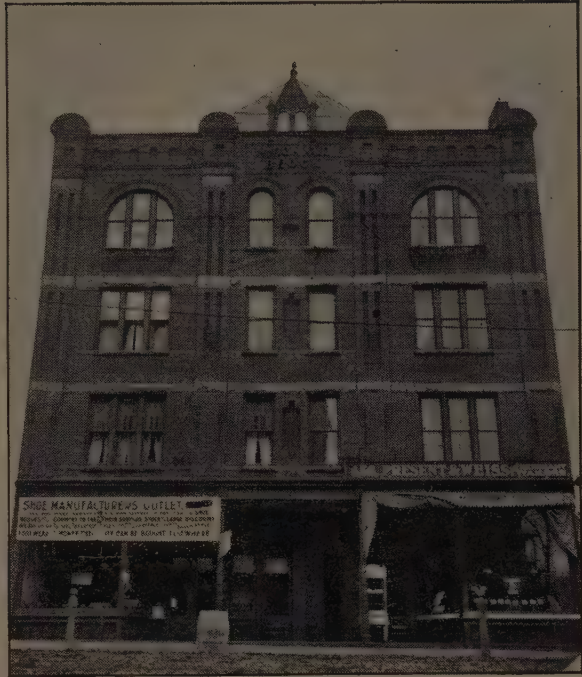


FIG. 1.

SECTION 2. TIME EXPOSURES INDOORS.



Diagram showing position of Camera.

First put the camera in position. The diagram shows the proper position for the camera. It should not be pointed directly at a window as the glare of light will blur the picture. If all the windows cannot be avoided, pull down the shades of such as come within the range of the camera.

To make a time exposure, place the camera on some firm support, like a table or tripod, focus carefully (this, of course, does not apply to fixed focus cameras) on the principal object and locate the image in the finder.

FOCUSING ON THE GROUND GLASS.

When using plates, or cameras having a removable roll holder, the focusing may be done on the ground glass if desired. The plate or roll holder being removed and the shutter opened, the image may be seen (reversed) upon the ground glass. Cover the head with a focusing cloth of some opaque material and look on the ground glass, *not through* it. Focus by moving the lens back and forward until the picture is sharp. Then close the shutter, insert plate or roll holder and proceed as before described.

If the light is poor the focusing may be done with the largest stop and a smaller one put in position afterward.

Set the shutter and all being in readiness press bulb or lever as the case may be, to open shutter. Give the proper time (using a watch if more than two seconds) then close the shutter.

TIME NEEDED FOR INTERIOR EXPOSURES.

The following table is an excellent guide for making interior exposures and is based upon the time needed for exposures with the stop ordinarily used for snap shots in single lens cameras, and with the No. 8 stop in all Rapid Rectilinear lenses. When a smaller stop is used the time must be increased proportionately.

White walls and more than one window :

bright sun outside, 2 seconds ;	cloudy bright 10 seconds ;
hazy sun, 5 seconds ;	cloudy dull, 20 seconds.

White walls and only one window :

bright sun outside, 3 seconds ;	cloudy bright, 15 seconds ;
hazy sun, 8 seconds ;	cloudy dull, 30 seconds.

Medium colored walls and hangings and more than one window :

bright sun outside, 4 seconds ;	cloudy bright, 20 seconds ;
hazy sun, 10 seconds ;	cloudy dull, 40 seconds.

Medium colored walls and hangings and only one window :

bright sun outside, 6 seconds ;	cloudy bright, 30 seconds ;
hazy sun, 15 seconds ;	cloudy dull, 60 seconds.

Dark colored walls and hangings and more than one window :

bright sun outside, 10 seconds ;	cloudy bright, 40 seconds ;
hazy sun, 20 seconds ;	cloudy dull, 1 minute, 20 seconds.

Dark colored walls and hangings and only one window :

bright sun outside, 20 seconds ;	cloudy bright, 80 seconds ;
hazy sun, 40 seconds ;	cloudy dull, 2 minutes, 40 seconds.

The foregoing is calculated for rooms whose windows get the direct light from the sky and for hours from 3 hours after sunrise until 3 hours before sunset.

If earlier or later the time required will be longer.

As a general rule use a medium sized stop for time exposures indoors.

SECTION 3. TIME EXPOSURE IN THE OPEN AIR.

When the smallest stop is in the lens the light admitted is so much reduced that time exposures out of doors may be made the same as interiors but the exposure must be much shorter.

WITH SUNSHINE—The shutter can hardly be opened and closed quickly enough to avoid over exposure.

WITH LIGHT CLOUDS—From $\frac{1}{2}$ to 1 second will be sufficient.

WITH HEAVY CLOUDS—From 2 to 5 seconds will be required.

The above is calculated for the same hours as mentioned above and for objects in the open air. For other hours or for objects in the shadow, under porches or under trees, no accurate directions can be given ; experience only can teach the proper exposure to give.

Time exposures cannot be made while the camera is held in the hand. Always place it upon some firm support, such as a tripod, chair or table.

STOPS.

A volume might be written on the subject of stops, but a few lines will suffice to give the amateur an idea of why they are necessary, and how they should be used.

The best part of a lens is its center, *i. e.*, those rays of light which pass through the lens at or near the center will be correctly refracted and will therefore give the image clear and sharp on the ground glass, while the rays which pass through the outer edges of the lens will not make such a clear and distinct image. It can thus be seen that the smaller the stop opening the sharper the picture, because the outside rays will be cut off. But we find also that with a small diaphragm or stop opening we cut down the light to a great extent. If the beginner has a camera with focusing glass it will be well for him to focus on some object on the ground glass, using the largest diaphragm and carefully noting the lines to see if they are sharp. Then let him put a smaller stop in position, noting the increase in sharpness and the decrease in light. The better the lens the larger the stop opening which we can use successfully, and consequently the "faster" the lens. Suppose we have one lens of 8 inch focus and we find that in a given light we can make a clear, sharp picture in 5 seconds with a stop one inch in diameter, while with another lens of same focal length we must use a stop only one-half inch in diameter in order to get a sharp picture. How would they compare in speed? Nine people out of ten will jump at conclusions and say that we must give the lens with the half inch opening 10 seconds. In this case the first impression is not correct. We must give four times the time or 20 seconds, because the area of the one inch stop is four times that of the half inch stop. We find that we can get a simple little rule from this and if we know the correct exposure with one stop we can figure for ourselves the correct exposure for the others: *The time variation between two stops is inversely as the square of their diameters.*

With our single lens cameras there are stop openings of three sizes, the largest, for ordinary snap shots, the second, (which has

about $\frac{2}{3}$ the diameter of the largest) for snap shots on the water and in tropical or semi-tropical climates or for time exposures indoors, and the smallest, ordinarily used for time exposures out of doors—never for snap shots.

With the double lenses there is a greater number of stop openings and they are arranged upon what is known as the Uniform System, commonly abbreviated to, "U. S."

Of course when we say in a general way that the speed of a lens depends upon the diameter of the stop opening we do not mean, for instance, that a Pocket Kodak stop opening must be as large as the diaphragm in the lens of an 8 x 10 camera in order to have the same speed, but it must be as large in *proportion*, and that proportion we find is based upon the length of focus (the distance between lens and plate) of the lens. The proportionate size or the "*value*" of the stop opening is designated by f , and is the quotient obtained by dividing the focal length of the lens by the diameter of the stop. Taking, for instance, a lens of 8 inch focus with a stop one inch in diameter and we find that $8 \div 1 = 8$. Hence, 8 is the f value of the stop and would be designated: f 8. Suppose our stop is $\frac{1}{4}$ inch in diameter, we would then have $8 \div \frac{1}{4} = f$ 32.

For convenience the Uniform System of marking stop openings has been adopted by nearly all manufacturers of iris diaphragms and the following table will help the amateur to understand the meaning of these markings by giving the f value for each one :

$$\text{U. S. } 4 = f \ 8$$

$$\text{U. S. } 8 = f \ 11.3$$

$$\text{U. S. } 16 = f \ 16$$

$$\text{U. S. } 32 = f \ 22.6$$

$$\text{U. S. } 64 = f \ 32$$

$$\text{U. S. } 128 = f \ 45.2$$

The convenience of the U. S. system is at once apparent when we understand that each higher number stands for an opening having half the *area* of the preceding opening. Between each

number, therefore, we simply double the time. For instance, the table given on page 16 is for use with stop No. 8 with the No. 4 Cartridge Kodak. If we use stop No. 16 we must give twice, or if No. 32 four times the time of the table, while with stop No. 4 we would give only one-half the time of the table.

Ordinarily the appended table is a good one to follow in the use of the stops with a rapid rectilinear lens, but there are some exceptions :

No. 4.—For instantaneous exposures in *slightly* cloudy weather and for portraits. Do not attempt instantaneous exposures on dark, cloudy days.

No. 8.—For *all ordinary instantaneous exposures* when the sun shines.

No. 16.—For instantaneous exposures when the sunlight is unusually strong and there are no heavy shadows ; such as views on the seashore or on the water, or in tropical or semi-tropical climates : also for interior time exposures.

Nos. 32 and 64.—For interiors. *Never for instantaneous exposures.*

No. 128.—For time exposures outdoors in cloudy weather. *Never for instantaneous exposures.* The time required for time exposures on cloudy days with smallest stop will range from $\frac{1}{2}$ second to 5 seconds, according to the light. The smaller the stop the sharper the picture.

If you use the smallest stop for instantaneous exposures, absolute failure will result.

The No. 4 stop is not to be used when absolute sharpness is desired, as the opening is so large that few lenses will have a good "depth of focus" with it—*i. e.*, only the objects at the exact distance focused will be sharp, those nearer by or farther away being more or less "out of focus."

We find in the instruction books for the fixed focus Kodaks having rapid rectilinear lenses that we are told to use the No. 16 stop for ordinary snap shots, while the above table says to use No. 8. The reason for this exception is easily explained, and to avoid con-

fusion and apparent contradiction, should be given : You have, no doubt, often noticed that many photographs are more fully timed in the center than at the edges and, for instance, that you could mark out a place, say, $3\frac{1}{2} \times 3\frac{1}{2}$ inches in the middle of a 5×7 photograph that would be fully timed, while the outer edges were considerably under-timed. Now the lenses on the $3\frac{1}{2} \times 3\frac{1}{2}$ Special Bullet and Bulls-Eye Kodaks will in reality cover a 5×7 plate with the No. 16 opening, and so, by using only the central portion where the greatest illumination occurs, we find it practical to make snap shots with this small opening.

Sharpness is extremely desirable in a picture, but what we call "roundness" and "atmosphere" is perhaps fully as important. What is meant by these rather vague terms is sometimes puzzling to the beginner and they are, perhaps, best explained as referring to that quality in a picture which gives the proper idea of both distance and perspective—that quality which is the opposite of the silhouette ; which makes every object appear in proper relation to every other object and gives life and character to the picture. "Atmosphere" and "roundness" we find by practical experience are somewhat lost by using too small a stop. We should, therefore, use the largest opening which will give us a sharp picture.

PRACTICAL HINTS.

In the foregoing pages we have given a bare outline of how to make snap shots and time exposures and further on we shall give the details of development. Before, however, taking up the chemical part of picture making we propose to treat of some of the important details of exposure.

PHOTOGRAPHING MOVING OBJECTS.

There is probably nothing in picture taking in which the amateur asks more unreasonable things than in the making of

snap shots of rapidly moving objects. If, for instance, he is an enthusiastic bicyclist he takes his camera to the first race meet, secures a position alongside the tape and as the riders finish, sprinting at a 1:40 clip, he takes a broadside of them from a distance of ten feet and is disappointed in the resulting blur, for he has nothing else. Now let us see the reason for this.

If he has a double lens instrument with an Eastman pneumatic shutter it has worked in approximately $\frac{1}{50}$ of a second, an apparently very short space of time, but we find on figuring it out that a bicyclist riding at the rate of a mile in one minute, forty seconds, covers 52.8 feet in a second or over twelve inches in $\frac{1}{50}$ of a second, the time the shutter is open—a sufficient distance to ruin the image. The distance the image will move on the plate during exposure is to the distance the object moves, as the focal length of lens is to distance from lens to object. In this case we will suppose the focus of lens to be six inches, and we know the distance from lens to object to be ten feet (120 inches) and the distance the object moves approximately twelve inches. We will let X stand for distance image moves on the plate and it gives us the following equation. $X : 12 :: 6 : 120 = \frac{6}{10}$. Of course, the object moving $\frac{6}{10}$ of an inch on the plate ruins the picture. We find then that in order to take pictures of moving objects at right angles there are two factors of prime importance—the speed of shutter and the distance from the object. In the ordinary amateur outfit the shutter speed cannot be materially increased and we must therefore take the picture from further away. Experiment has proven that in order to successfully take pictures of rapidly moving horses, etc., from a position near by and at right angles the shutter must work in from $\frac{1}{500}$ to $\frac{1}{1000}$ of a second (Muybridge claimed to have used a shutter working in $\frac{1}{2000}$ of a second) and this extreme speed necessitates a special camera and lens as well as a special shutter, and then the resulting photographs are mere silhouettes, because with the present speed of plates and films there is not time to get any detail. But there are tricks in all trades and satisfactory pictures of rapidly moving objects can be readily made by photo-

graphing them from partly in front as well as from a reasonable distance. The accompanying picture of the Empire State Express moving at full speed shows plainly what can be done in this direction. It was made with a Pocket Kodak and is a good illustration of what can be accomplished by taking the picture



Kodak.

Wm. Bishop.

EMPIRE STATE EXPRESS.

from a point at a considerable distance from the object and also somewhat ahead of it. By acting on this hint the amateur can soon learn to take pictures of rapidly moving objects, and in such a manner as to largely avoid the disagreeable blurring.

LANDSCAPES.

There is a chance for a volume here, but it is not within the scope of this small booklet to do more than suggest the possibilities that are before the Kodaker. Painters say that the trouble with photography is that it reproduces with perfect fidelity the unimportant details of nature but fails to portray her strength and character, her subtle moods, her broad effects. But occasionally the camera falls into the hands of an artist who handles it with the master's touch, and painters and sculptors and critics must applaud.

Too much detail is the weak point in nine out of every ten landscape photographs. The land and seascape pictures which we give here are good illustrations of what may be accomplished by photography in portraying the moods of nature. Mr. Robinson in his Rusthall Quarry has given us a rugged bit of English country scenery—a peaceful summer afternoon in a deserted quarry. We notice no details of foreground but



Kodak,

RUSTHALL QUARRY.

H. P. Robinson.

his massing of light and shade catches and pleases the eye, makes one long to rest beneath the spreading trees. No less strong in its conception is Mr. Stieglitz's "A Winter's Afternoon." One sees but little of the detail, hardly observing even the

Bartholdi Statue in the distance, yet can almost feel the chill of the winter's wind that comes over the dark waters of the bay. "Sunset," too, is a picture of remarkable simplicity and strength and the weird twilight effect is heightened by the almost barren shore, the solitary tombstone and the distant belfry tower—

all leading up to the lengthening shadows of the clump of trees and suggesting the coming night.

How different the sunset effect in "Sheep Feeding," where the introduction of life gives to the whole a more cheerful feeling,



Kodak.

W. C. Motteram.

SHEEP FEEDING.



Kodak.

A WINTER'S AFTERNOON.

Alfred Stieglitz.



Kodak.

SUNSET.

G. E. Valteau.

reminding one of the pleasant morrow promised by the brilliant glow in the west, rather than of the gloomy night that is to intervene.

In "A Stormy Morning" we have a picture giving us the breath and spirit of the sea. The boats pulled for safety high on the beach, the white topped breakers, the banks of clouds—all conspiring to make us feel the freshness of a summer morning's breeze.

The careful observer will note in all these pictures a simplicity which gives them strength. They do not try to show too much,

and in none of them are there inappropriate objects. A "pretty bit" is always preferable to a "general view." It centers the interest. Don't try to get the whole township on a single plate unless the township consists of a towering peak which of itself is a picture.



Kodak.

A STORMY MORNING.

Avoid giving the picture a mechanical look by breaking up, so far as possible, the straight lines, yet preserving enough of them so that it will not be a jumble. Do not bring the horizon line, especially if it be unbroken, across the center of the picture but have it either above or below it. Do not bring the principal object of interest in your picture to the exact center of the plate, but rather a little to the left or right and a little above or below the center. Note, if you please, how this rule has been followed in the accompanying illustrations and how pleasing is the effect. On the other hand, to be successful your picture must be well balanced in light and shade or it will appear to be "lop sided." Rusthall Quarry gives a most excellent illustration of this, the heavy shadow cast by the rocky cliff on the right balancing the mass of foliage on the left. No doubt the artist bided his time and having seen that there was a "picture" in the old quarry watched for the correct conditions of light and shade. Some workers, and good ones, too, will tell you that in composition you must follow certain geometrical figures, the triangle, the semicircle, etc., but if the foregoing hints be borne in mind they will suffice for your first work, will start you in the right direction and later on, when you have had a few lessons in the school of experience, you can, if you like, take up a more detailed study of the rules of composition.

THE RISING AND SLIDING FRONT.

Occasionally in the taking of photographs of buildings or in landscape photography it is found that the subject cannot all be readily included except by tilting the camera, which would produce the undesirable results shown on page 15. To assist in correcting this fault some cameras are provided with a rising front which may be utilized in cutting out an undesirable foreground or to assist in taking in the top of a high building, etc. To illustrate this we take the Cartridge Kodaks which are manipulated as follows :



FIG. I.

Fig. I. shows how to raise or lower the front when making vertical exposures.

Simply grasp the springs which engage the circular grooves in the posts at each side of front board and move the front board up or down to the desired position as indicated on the ground glass and release springs to hold front in place.

The front can be moved to the right or left (up and down for horizontal exposure) by pressing forward on lever back of right hand post shown in Fig. II. and sliding front in either direction to the desired position. Lock in position by pressing back on same lever.



FIG. II.

In order to make a sharp picture when using the rising front it will be better to use a small stop (No. 32 or 64) and as this in turn necessitates a time exposure, a tripod or other firm support must be provided. Experience alone can teach the many ways in which the rising and sliding front may be used for composing artistic pictures.

PORTRAITURE AT HOME.

There is no more interesting branch of picture making than portraiture, and the required accessories can be found in every

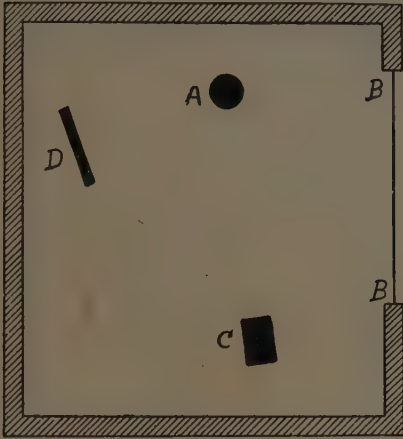


FIG. 1.

A. Sitter, C. Camera,
B. B. Window, D. Reflector.

home. To attain good results it may take a little patience and study, but for all this, the amateur will be well repaid in the satisfaction brought by his first successes. The first element to be taken into consideration is the light. A north light is preferable and

it should, if possible be unobstructed by trees or buildings; but where these cannot be avoided we must simply make up for them by giving additional time to the exposure. The light should also be a top light, that is, it should come from slightly above the head of the sitter, a result easily accomplished by opening blinds and shades to their full limit and then pinning a cloth over the lower half of the window.

AVOID A CROSS LIGHT.
All of your light must come from one source, otherwise the shadows will be so cut up as to lend a disagreeable and



Kodak.

John E. Dumont.

THE CHORISTER.

unnatural appearance to the face. Having arranged the window B B and placed the camera at C, the subject may be seated at point A. Fig. 1. The details of exposure, whether the focusing is to be done by scale or by ground glass, the stop to be used, etc., must depend upon what camera you have. How the sitter is to be placed depends largely upon the features. A good pose and perhaps the simplest to begin with, is obtained by seating the subject at A, facing the camera and then turning the face slightly away from light. Care should be taken to have the eyes in an easy and natural position and looking very nearly straight ahead. If turned decidedly to either side they will give a disagreeable expression, a sort of caricature of slyness. When the sitter is in position, take notice of the side of the face away from the light and if the shadows are too deep use a reflector at point D to soften

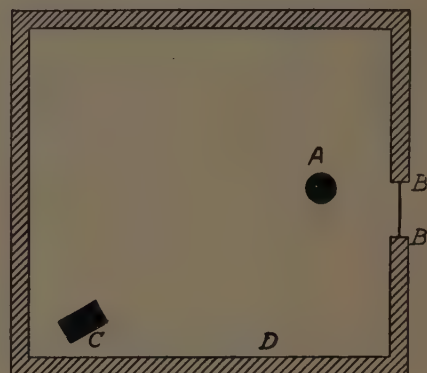


FIG II.
A sitter, B B window, C camera, D
point toward which face is to be
turned.

them—in lieu of a regular screen a sheet thrown over the back of a chair will answer very well.



Kodak.

C. H. Turpin.

A REMBRANDT PORTRAIT.

What is known as a Rembrandt lighting is often very effective and is obtained by photographing from the shaded instead of from the lighted side of the face. By placing the subject at point A in Fig. 2, facing point D and setting up the camera at point C we obtain an effect similar

to that shown in the portrait herewith. The relative proportion of the shaded and lighted sides of the face can be changed by simply

turning the sitter's head toward or away from the light. A slight change in position makes a wonderful change in the lighting and the sitter's face should be carefully studied to obtain the best effects.

In "A Rembrandt Portrait" we give a marked case of this lighting; in "The Chorister" the artist has used the Rembrandt lighting but a trifle. Between these two extremes many effects can be obtained that are also desirable.

The background should be appropriate and simple and should form a contrast with the sitter. A portiere hung against the wall makes a very satisfactory dark background, and where a light one

is desirable a sheet will answer the purpose, but in case it is used the assistance of a third party should be called in to keep the sheet in motion during exposure so that it will be out of focus.

A good light background may frequently be obtained by posing the subject in front of a lace window curtain, the shades, of course, being drawn down in such a case. As a usual rule, however, the dark backgrounds are more desirable and prints from negatives made with them are

more readily handled by the amateur than those with light backgrounds which require vignetting.



Kodak.

J. Craig Annan.

AGNES REID WARNOCK.



Kodak.

DOROTHY.

Rudolph Eickemeyer, Jr.

After your first experiments you will learn to study your sitter's face critically and will become able to judge by a rapid scanning of the features whether a profile, a half or a full front will give the most artistic results.

In portrait work use the largest stop that will cut the picture sharply, thus making a short exposure possible—for the shorter the exposure the more natural will be the expression on the face of the sitter. No matter if the background is out of focus—it is merely a necessary evil in the picture and will divert less attention from the subject if a trifle subdued by indistinctness.

The accompanying illustrations show what can be accomplished in the way of portraiture with a Kodak. "Dorothy," a charming example of home portraiture is from the Kodak of a man who is now a photographer by profession, Mr.

Eickemeyer, but he cannot resist the temptation to still indulge his old hobby of picture taking within his own home. The beginner will do well to study carefully the posing and lighting of these figures that he may profit thereby.



Kodak.

Chas. I. Berg.

A PORTRAIT.

KODAK PORTRAIT ATTACHMENTS.



By Rudolf Eickemeyer, Jr.

FOLDING POCKET KODAK AND PORTRAIT
ATTACHMENT.

mantello photograph. The accompanying halftone illustration is reproduced in the exact size, from a negative made with a Folding Pocket Kodak and Eastman's Portrait Attachment, and gives a very good idea of the work that can be accomplished by the Kodak and this little device.

This Portrait Attachment is for use at a distance of $3\frac{1}{2}$ feet from the subject only and its effect is to simply make the lens "cut sharp" pictures at this distance. It throws more distant objects out of focus and is therefore to be used for bust portraiture only.

In order to give greater scope to the fixed focus Kodaks so that large bust portraits may be made with them we have devised our Portrait Attachment. This is a simple little device consisting of an extra lens so mounted that it may be instantly attached in front of the regular lens, and enabling the Kodaker to make sharp pictures with the fixed focus Kodaks at a distance of only three and one-half feet from the subject. With the $3\frac{1}{2} \times 3\frac{1}{2}$ size this gives a head about the size that heads are usually made to occupy in an ordinary

OUT-DOOR PORTRAITURE.

Don't try to make portraits of your friends in the sunlight, at least, not if you expect to retain their good will. If their figures be merely accessory to a landscape, or as part of some interesting bit, there is no harm in snapping them in a bright light, but where the face is the *central point of interest* in the picture it must be in the shade. Strong sunlight destroys the expression of the eyes, while the heavy shadows cast by the nose and other features, or by the hat, if one be worn, will entirely distort the face, and while a likeness may remain, it will certainly be an unkind one. Out-door portraits should, therefore, be taken in the shade of a veranda or tree and made by time exposure. The time to be given must be learned by experience, depending largely as it does on the amount of reflected light, the hour of the day and the time of year. After a few trials the amateur will be able to properly judge the light and time the exposure, but he should understand that it is easier to save an over-exposed than an under-exposed negative and he should therefore be sure to give time enough.

Of one thing, however, he should be careful. Many a good portrait has been ruined by an inappropriate background and there is no uglier or more commonly used background than the clap-boarded side of a house. The regular lines crossing the picture are most trying to the eyes and are most inartistic. Backgrounds as a rule should form a contrast with the sitter and should not be a prominent feature of the picture. A trellis of vines, the dense shade of a grove back of the subject, or a grassy slope all make pretty and appropriate backgrounds when properly handled.

FLASH LIGHTS AT NIGHT.

The rays of old Sol, once an all-important factor in picture making, are no longer an essential for indoor work. For capturing the beauties of the landscape we still depend upon him, but for interior work, especially at night, man's ingenuity has supplied

a substitute for the sun's rays—equally effective and more manageable. For many purposes, in fact, the flash light is more desirable than sunlight. It can always be depended upon to shine when wanted and with just the proper brilliancy; it can always be so placed as to make the shadows fall in the desired direction and, photographically speaking, it turns night into day. To the amateur "bottled sunlight" is an especial convenience, for his photographic work is frequently confined to the night time, to



say nothing of the many times that he brings the flash light into play in photographing his friends at evening gatherings. Indeed, it is as a means of photographing one's friends on such occasions that the flash light is most commonly used, but the experienced

amateur knows of many other ways in which to avail himself of its actinic powers.

Frequently it is desired to take a photograph of an interior which, by reason of a lack of illumination, or because some window, which cannot be covered comes within range of the camera, is impracticable by daylight. In such cases a charge of Flash Powder solves the problem. Again, it is desired to photograph a very large room which is lighted from only one side by daylight. To get a full time exposure in the darkest corner of the room would cause a decided over exposure near the windows. A flash of powder, concealed from direct line with the lens by some article of furniture or by a screen, illuminates the dark corner and gives a properly lighted exposure of the entire room. These are the ordinary uses of the flash light and by following the simple rules laid down the amateur can make pictures with as great an assurance of success as when making snap shots out of doors. For the production of unusual effects, however, one must study all the conditions, weighing carefully cause and effect, and must not yield to disappointment if success be not attained at first. There are many ways in which the flash may be made to co-operate with other artificial light or with daylight to produce a unique or artistic effect, and to the serious worker it offers another means to the end most desired by all photographic workers—pictorial effect.

The Eastman Flash Powders are put up in three ways: In bottled form for use in the flash lamp, in cartridges having fuses and requiring no extras, and in flash sheets which are used by simply pinning them up against a cardboard on the wall and igniting the lower corner.

The same general rules will apply whether the lamp, the cartridge or the flash sheet be used.

PREPARATION OF THE FLASH LIGHT.

The light should *always* be placed two feet behind and two to three feet to one side of the camera. If placed in front of, or on

a line with the front of camera, the flash would strike the lens and blur the picture. It should be placed at one side as well as behind, so as to throw a shadow and give a little relief in lighting. The flash should be at the same height or a little higher than the camera. A piece of cardboard a foot square placed under the powder will prevent any sparks from the flash doing damage. A sheet of white cardboard set up behind the flash will act as a reflector and increase the strength of the picture.

TAKING THE PICTURE.

Having the camera and the powder both in position, set the camera shutter open, as for a time exposure, but using the stop ordinarily used for snap shots.

Ignite the powder. There will be a bright flash which will instantly impress the picture on the sensitive film. Then close the shutter.

THE POWDER.

The amount of powder required to light a room varies with the distance of the object farthest from the camera, and the color of the walls and hangings.

TABLE.

For 10 feet distance and light walls and hangings use	{ 1 Cartridge No. 2. 1 even teaspoonful. 1 Flash Sheet.
For 10 feet distance and dark walls and hangings use	{ 2 Cartridges No. 2. 2 even teaspoonfuls. 2 Flash Sheets.
For 15 feet distance and light walls and hangings use	{ 2 Cartridges No. 2. 2 even teaspoonfuls. 2 Flash Sheets.
For 15 feet distance and dark walls and hangings use	{ 3 Cartridges No. 2. 3 even teaspoonfuls. 3 Flash Sheets.

For 25 feet distance and light walls and hangings use { 3 Cartridges No. 2.
3 even teaspoonfuls.
3 Flash Sheets.

For 25 feet distance and dark walls and hangings use { 4 Cartridges No. 2.
4 even teaspoonfuls.
4 Flash Sheets.

NOTE.—The No. 1 Cartridges hold 50% *more* powder and the No. 3 about half as much as the No. 2 and should be used accordingly.

PORTRAITS.

Place the sitter in a chair partly facing the camera (which should be at the height of an ordinary table), and turn the face slightly towards the camera. The proper distance from the camera to the subject can be ascertained by looking at the image in the finder.

The powder should be on the side of the camera away from the face, that is, the sitter should not face the flash.

GROUPS.

Arrange the chairs in the form of a semi-circle, facing the camera, so that each chair will be exactly the same distance from the camera. Half the persons composing the group should be seated and the rest should stand behind the chairs. In case any of the subjects are seated on the floor the limbs should be drawn up close to the body ; not extended towards the camera.

BACKGROUND.

In making single portraits or groups, care should be taken to have a suitable background against which the figures will show in relief; a light background is better than a dark one, and often a single figure or two will show up well against a lace curtain. For larger groups a medium light wall will be suitable.

The *finder* on the camera will help the operator to compose the group so as to get the best effect. In order to make the image visible in the finder, the room must be well lighted with ordinary lamplight, which may be left on while the picture is being made, provided none of the lights are so placed that they show in the finder.



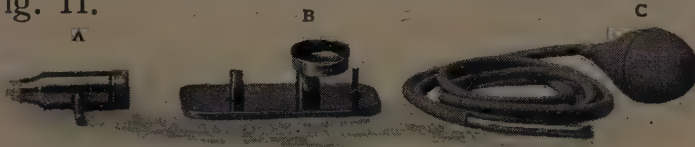
B. Cline.

A STUDY.

(1 teaspoonful Eastman's Flash Powder.)

DIRECTIONS FOR USING EASTMAN'S FLASH LAMP.

I. Immerse the burner A, Fig. I, in alcohol until the packing is well saturated, then attach burner and tubing in the positions shown in Fig. II.



A—Burner. B—Pan. C—Bulb.

FIG. I.

II. Put the Flash Powder in the pan B, allowing a little of it to drop into the air chamber so that when the bulb is pressed it will blow the powder into the flame.



FIG. II.

III. Light the alcohol burner.

IV. Turn the burner so that it will be over the flash powder as shown in Fig. III.

V. Open the camera shutter and, all being in readiness, stand at arm's length and press the bulb. Fig. III.

VI. Close the camera shutter.

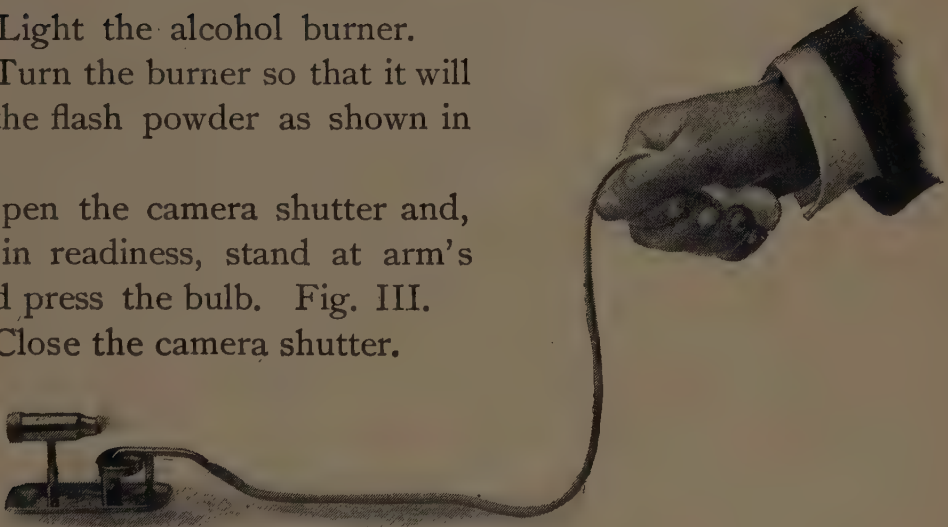


FIG. III.

WARNING.

Always turn the burner away from the flash pan when the latter is being filled.

Never fill the pan when the burner is lighted and toward the pan as in Fig. III.

Never light the burner when it is over the powder.



Kodak.

"COME WE TO THIS."

B. CLINE.
(See page 46.)

Never pour the powder from the bottle directly into the pan.

Always use spoon or measuring cup.

Never hold bulb in hand when turning burner over powder.

An accidental squeeze of bulb would discharge the flash.

Never use this powder in magazine lamps.

DIRECTIONS FOR USING FLASH CARTRIDGES.

Remove the cover and rubber band from the cartridge and place it upon a cardboard. All being in readiness, as before described, open the camera shutter, ignite the fuse while at arm's length, protecting the eyes in the meantime from the brilliant flash.

Close the camera shutter.

If two cartridges are to be used the contents of one of them can be poured into the other, care being taken, however, that if any of the powder spills over that it does not lie in such a position as to practically shorten the fuse.

Fuses used on these cartridges are very quick.

DIRECTIONS FOR USING FLASH SHEETS.

Pin a flash sheet by one corner to a piece of cardboard which has previously been fixed in a perpendicular position. If the cardboard is white it will act as a reflector and increase the strength of the picture. All being in readiness, as before described, open the camera shutter, stand at arm's length and touch a match to the lower corner of the flash sheet.

Close the camera shutter.

When two or more sheets are to be used they should be pinned to the cardboard, one above the other, the corners slightly overlapping.

As a matter of precaution, place a piece of cardboard beneath as well as one behind the flash sheet, so that in case a piece of burning powder should fall it will do no injury.

IN GENERAL.

In portrait work it is always best to have the room well lighted when making the flash, if it can be done in such a way that none of the lights come within the range of the lens. If the room is darkened the sudden flash of the powder so strains the eyes of the sitters that it almost invariably gives them a staring look, whereas

if the room is already well illuminated by gas or lamp-light the strain is not great and the eyes will have a natural expression. Of course, where the room is brightly lighted the shutter should not be opened until the instant before the flash is made, and should be closed quickly after the flash is over.



A BIRTHDAY PARTY.
(2 teaspoonfuls Eastman's Flash Powder.)

When more than one flash light is to be taken, the windows should be opened and time allowed between each flash to free the room thoroughly from smoke, otherwise all of the pictures after the first one are liable to have a "foggy" effect. The Eastman Flash powders give a minimum of smoke, but the lens is even keener than the eye and what will seem to be but little smoke in a room will often-times have a decided effect upon the picture.

When, for any reason, it is necessary that the shutter remain closed until the instant the flash is discharged and be closed again instantly afterward, it is well to use the Eastman flash lamp, as by so doing the shutter can be operated with one hand and the flash with the other and their action thus made simultaneous.

In using the flash sheets it should be borne in mind that they are not instantaneous, and in portrait work the subjects should, therefore, be warned to remain still the same as if for a time exposure. For photographing young children or large groups these sheets are not recommended, owing to the fact that it is difficult to keep the subjects quiet during exposure. About one and one-half seconds are consumed in burning a single sheet and the light is much less brilliant than is the instantaneous flash—a decided advantage *where the subjects can be depended upon to keep quiet*, as the eyes are not strained by the flash and do not have the staring effect so often seen in flash light pictures.

SECONDARY USES OF THE FLASH LIGHT.

The amateur, ambitious of securing pictorial effects, will often find an opportunity to use the flash in connection with some other light, either artificial or daylight. On page 36 is shown a picture taken in one of the Eastman Kodak Company's dark rooms by means of the flash in conjunction with the incandescent lights. In the dark room these lights are covered with orange paper, but for this occasion the paper was removed from one side so that a strong light would be thrown upon each operator as he stood at his developing tray. Two charges of Flash Powder of about one thimbleful each were then arranged, one near the camera and the other behind a screen about half way down the room. The subjects being posed, two minutes' exposure was given by the electric lights, followed by the firing of the two small charges of flash powder to bring out just a trifle of detail in the shadows. To the eyes of those familiar with the gloom of the dark room this picture is strikingly effective, especially when the lights and high lights are given an orange tint.

The portrait of the well-fed monk, entitled "Come we to this?" is another illustration of what can be accomplished through a combination of artificial lights. After arranging the subject and accessories a bicycle-lamp, put inside a box which stood between the skull and scroll, was so placed that it threw a powerful light on the subject's face and was in a line toward the candle. After two minutes' exposure the box and lamp were quickly removed, the candle lighted, a weak flash light made and the shutter closed.

These two illustrations are given merely to show the possibilities of producing pictorial results by a combination of the flash with other artificial lights. They will suggest to the amateur many ways in which this light can be utilized in producing artistic effects—the light from a reading lamp, or from the grate-fire, the light from the moon, can all be made to work in such harmony with the flash as to produce photographs which are not only unusual and novel but have also a lifelikeness and fidelity to nature that make them *pictures*. The flash-light is one more agent that assists in making the photographer the master of his camera. Having control, not only of his lens, shutter and chemicals, *but of the source and volume of his light*, his work becomes creative, and even the devotees of palette and brush must acknowledge, if his results are pictorial, that he is an artist, not a "mere copyist."

DEVELOPING.

To fully enjoy photography every amateur should learn to do his own developing and printing. It requires a little care and patience, a little attention to detail, but is not difficult if the beginner will *follow instructions*. It is safe to say that every plate and paper manufacturer knows best how his products should be handled to get the best results. When he says that paper must be washed for an hour, he means sixty minutes. If half an hour would answer as well he would say so for he is financially interested in making the handling of his product as simple as possible. It means more customers for him. The most aggravating errors in photography are those made by people who have been told, or have observed enough to have a smattering of what they must do, but "haven't time to read manuals and direction sheets." Such beginners are longer in making good pictures than the man who is an absolute ignoramus and knows it.

THE OUTFIT.

The first essential is a dark room. By a dark room is meant one that is wholly dark—not a ray of light in it. Such a room can easily be secured at night almost anywhere. The reason a dark room is required is that the film is extremely sensitive to white light, either daylight or lamplight, *and would be spoiled if exposed to it* even for a fraction of a second.

If possible have running water, but if this is not available provide a pitcher of *cold* water (ice water in summer), a shelf or table on which to work and (for use with film) a pair of shears.

Also provide a Developing and Printing Outfit which should contain :

1 Dark Room Lamp,
4 Developing Trays,
1 Glass Beaker,
1 Printing Frame,
1 Glass for same,
1 Stirring Rod,

Pkg. Hydrochinon Developer
Powders,
1 lb. Hypo-sulphite Soda,
Printing-Out Paper,
Bottle Toning Solution,
1 Pkg. Bromide Potassium,
1 Ounce Glycerine.

Such an outfit need not cost more than one or two dollars and will be sufficiently elaborate for your first work.

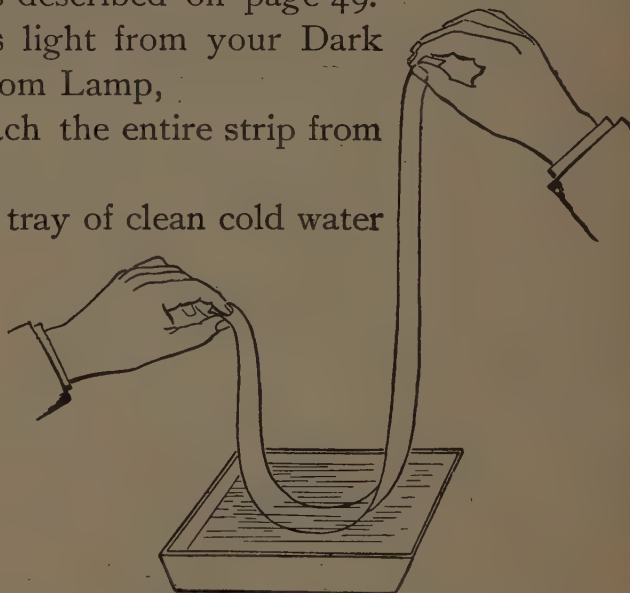
TO DEVELOP FILM.

Film, to avoid curling, must always be developed *face down*, otherwise it is handled in much the same manner as plates except, of course, that it must be cut up before printing.

For all Kodak cartridge rolls smaller than 4 x 5 we recommend that development be *started* in the strip as this method removes the possibility of cutting through the negatives. The same method may be used with the larger sizes, but owing to their length is, perhaps, not quite so convenient as to cut up the film before development is started as described on page 49. Having shut out all extraneous light from your Dark Room and lighted the Dark Room Lamp,

a. Unroll the film and detach the entire strip from the black paper.

b. Pass the film through a tray of clean cold water as shown in the cut, holding one end in each hand. Pass through the water several times, that there may be no bubbles remaining on the film. When it is thoroughly wet, with no air bubbles, place the strip of film in a tray of water, immersing it fully but not folding tightly so as to crack it.



c. Prepare the developer, as described on page 50.

d. Now pass the film through the developer in the same manner as described for wetting it and shown in cut. Keep it constantly in motion, and in about one minute the high lights will begin to darken and you will readily be able to distinguish the unexposed sections between the negatives.

e. With a pair of shears cut the negatives apart and place them face down in the tray of *clear water*.

The negatives may now be immersed in the developer one section at a time, and developed as described hereafter. Page 50.

This method must always be followed with the Cartridge Roll Holder rolls, but they may first be cut in two at point where perforations occur in the middle of strip.

ANOTHER WAY.

1. Unroll the film and cut the exposures apart as shown in Fig. 1.

In unrolling the film preparatory to development, care must be taken that the end be not allowed to roll up over the paper. The exposures should be cut apart with the PAPER ON TOP.

Fig. 2 shows a cartridge unrolled with the film on top. To correct this simply turn back the film as indicated by the dotted lines, thus bringing the film under the paper.

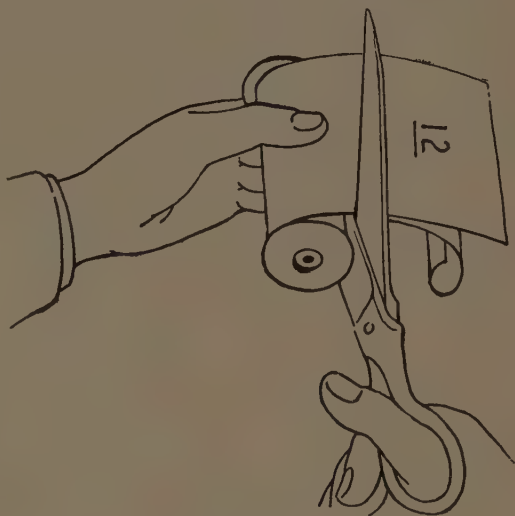


FIG. 1.
RIGHT.

2. Fill one of the trays nearly full of water, and put into it the exposures, one by one, *face down*; put them in edge-wise, to avoid air bells, and immerse them fully.

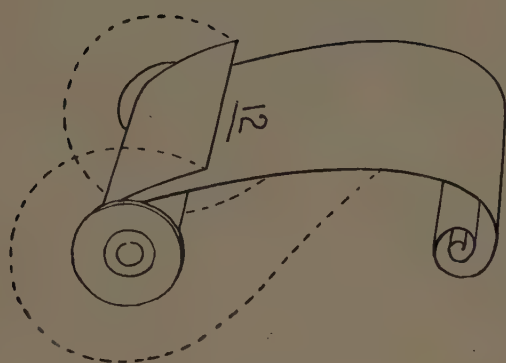


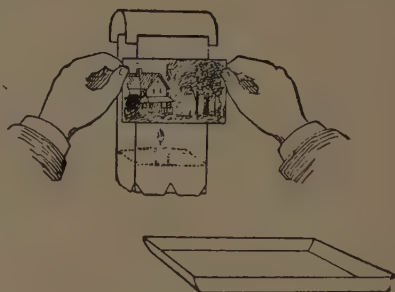
FIG. II.
WRONG.

Cover the tray with a bit of brown paper to keep out the light from the lamp.

3. Open one of the developer powders, then put the contents, (two chemicals) into the beaker and pour in 4 ounces of water. Stir until dissolved with the stirring rod and pour into second tray.

4. Take one of the exposures from the water and immerse it, *face down*, in the second tray. Rock it back and forth to prevent streaks and air bubbles ; in about one minute the film will begin to darken in spots, representing the lights of the picture, and in about two minutes the operator will be able to distinguish objects in the picture. The developer should be allowed to act 5 to 10 minutes. The progress of the development may be watched by holding the negative, from time to time, up to the lamp.

5. Transfer the developed film to the third tray and rinse two or three times with water, leaving it to soak while the next film is being developed.



NOTE.—Five or six 4 x 5 negatives can be developed, one after the other, in one portion of developer, made by use of Eastman's Hydrochinon Developer Powders, then it should be thrown away and a fresh portion mixed.

Only one negative should be developed at a time until the operator becomes expert, then he can manage three or four in the tray at one time and the developer will answer for a dozen films before being exhausted.

As each successive negative is developed it should be put, with the preceding negatives, in the washing tray and the water changed twice to prevent the developer remaining in the films from staining them.

6. Put two tablespoonfuls of Hyposulphite of Soda into the fourth tray, fill two-thirds full of water, and stir until dissolved. This is called the fixing bath.

7. Immerse the negatives one by one in the fixing bath until they are entirely clear of white spots and are transparent instead of milky by transmitted light. This will require about 10 minutes.

8. The yellow shade can be removed from the lamp as soon as all the exposures have been fixed.

9. Pour off the fixing solution into the slop bucket, and fill the tray with clear, cold water ; repeat this at intervals of five minutes, five or six times, keeping the negatives in motion, or transferring them back and forth to tray No. 3, one by one, to ensure the water acting evenly upon them.

The fixing solution must only be used in tray No. 4, and the negatives, after fixing, must not be put in either No. 1 or No. 2 trays. Neither must any of the fixing solution be allowed to touch the films, through the agency of the fingers, or otherwise, until they are ready to go into the fixing bath, otherwise, they will be spotted or blackened, so as to be useless.

10. When the negatives are thoroughly washed, put one-half ounce of glycerine into one pint of water, (four portions measured with the developer glass), stir well and soak the negatives in the solution for 5 minutes, then remove them and wipe off the surplus moisture with a soft, damp cloth, and pin them by the four corners, face up, to a flat surface to dry.

The glycerine solution may be used repeatedly.

The trays and beaker should now be rinsed out and set away to drain and dry.

When the negatives are dry, they are ready for printing.

DEFECTIVE NEGATIVES.

By following closely the foregoing directions, the novice can make seventy-five per cent. or upwards, of good negatives. Sometimes, however, the directions are not followed, and failures result.

To forewarn is to forearm and we therefore describe the common causes of failure.

OVER-EXPOSURE.

Caused by too much light.

Negative develops evenly, shadows almost as fast as high lights. No contrast, and no deep shadows. Over-exposure can be overcome in the development by the addition of a few drops of bromide of potassium to the developer. This will restrain the development, and a bottle containing

Bromide of Potash,	- - - - -	1 oz.
Water,	- - - - -	6 ozs.

should always be at hand when you are developing. If the negative flashes up too quickly, a half dozen drops of bromide should be shaken into the developer without delay.

After the Bromide has been added to the developer, it should not be used for another negative unless it is known to have been over-exposed.

UNDER-EXPOSURE.

Caused by making snap shots indoors, or in the shade, or when the light is weak, late in the day, or by closing the lens too soon on time exposures.

OVER-DEVELOPMENT.

Caused by leaving the negative too long in the developer.

In this case the negative is very strong and intense by transmitted light and requires a very long time to print. The remedy is to reduce by the following method:

REDUCER.

First soak negative 20 minutes in water, then immerse in :

Water,	6 ounces.
Hypo-sulphite Soda,	¼ ounce.
Ferri-Cyanide Potassium,	20 drops.

Rock tray gently back and forth until negative has been reduced to the desired density, then wash 10 minutes in running water or in four changes of water.

Negatives may be reduced locally by applying the above solution to the dense parts with a camel's hair brush, rinsing off the reducer with clear water occasionally to prevent its running onto the parts of the negative that do not require reducing.

UNDER-DEVELOPMENT.

Caused by removal from the developer too soon.

An under-developed negative differs from an under-exposed one, in that it is apt to be thin and full of detail, instead of harsh and lacking in detail. If the development is carried on as before directed, this defect is not liable to occur.

If a mistake has been made in developing and the negative does not appear strong enough (this can be judged only by experience), the negative can be improved by

Intensification—Lay the film in one of the empty trays and pour over it sufficient Intensifier to fully cover it; allow it to act until the film is all of one even color and then pour the Intensifier back into the bottle and wash the film in four or five changes of water for fifteen minutes.

Intensifier may be purchased already prepared or the amateur may put it up himself, using the following formula :

INTENSIFIER.

No. 1, 75 Gr. Bi-chloride of Mercury (corrosive sublimate)					
Poison,	-	-	-	-	5 oz. Water.
No. 2, 112 Gr. Iodide of Potassium,	-			2½ "	"
" 3, 150 " Hypo-sulphite of Soda,				2½ "	"

Dissolve separately and combine No. 1 with No. 2 and the resulting mixture with No. 3.

SPOTS, STREAKS, ETC.

Air bells on the film in the developer or fixing bath are liable to cause spots, and streaks are caused by allowing the film to remain uncovered in part by the various solutions while in them.

White, milky spots are evidence that the negative has not been properly fixed, and the negative should be put back into the fixing bath, and then rewashed.

IN HOT WEATHER.

Films or plates should be rinsed in three changes of water as soon as developed and transferred to a saturated solution of common alum for two minutes, then rinsed again and fixed. This hardens the film.

PYRO DEVELOPER.

Hydrochinon Powders are particularly desirable as they do not stain the fingers. If, however, the amateur desires to mix his own developer, the following may be substituted, all the other operations remaining the same as when Hydrochinon powders are used :

PYRO FORMULA.

PYROGALLIC ACID SOLUTION.

Pyrogalllic Acid,	-	-	-	-	½ ounce.
Nitrous or Sulphurous Acid,	-	-	-	-	20 minims.
Water,	-	-	-	-	32 ounces.

SODA SOLUTION.

Sulphite of Soda (crystals),	-	-	-	-	6 ounces.
Carbonate of Soda (crystals),	-	-	-	-	4 ounces.
Water,	-	-	-	-	32 ounces.

To develop, take

Pyro Solution, 1 oz.; Soda Solution, 1 oz.; Water, 2 oz.

If desired, Pyro powders can be substituted for above Pyro formula and used in same manner as described for Hydrochinon powders.

DEVELOPING DRY PLATES.

The foregoing directions apply to dry plates as well as films, the chemical treatment being the same, except that the preliminary wetting, and the soaking in glycerine may be omitted with plates.

Plates, however, must be handled in the solutions one at a time as they would scratch each other if a larger number were put into the trays simultaneously. They should also be developed *face up*.

PRINTING.

Having developed the negatives the final step in picture making is now in order—making the prints.

Of the many papers offered, the most desirable, for the beginner at any rate, is a gelatino-chloride (chloride of silver in an emulsion of gelatine) printing-out paper. In the negative we have learned that the image is latent until brought out by chemical action. In the printing-out paper the image “prints-out” at once. Before it is toned and fixed it is in the same condition as a proof received from the photographer. The chemical action clears the high lights and shadows, gives the proper tone and “fixes” the print, *i. e.*, makes it permanent.

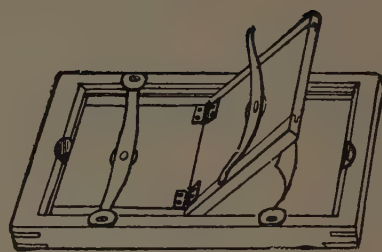
The processes of toning and fixing may be combined in one bath or may be done separately. For convenience we recommend the combined bath to the amateur, but care should be exercised not to overwork the bath. This bath will continue to give satisfactory tones long after the gold has been exhausted. This toning without gold, however, is not permanent and no attempt to economize by overworking the toning bath should be made, as disappointment will be the inevitable result.

PRINTING ON SOLIO PAPER.

Solio is a gelatino-chloride printing-out paper which the amateur will find very easy to handle and which gives beautiful glossy prints, capable of toning to a warm brown or to a cold purple.

The combined bath gives the best results when warm brown tones are desired and the separate bath is best for cold purple tones.

METHOD OF PRINTING. — Open the printing frame and lay the negative back down upon the glass* (the back is the shiny side). Place upon this a piece of Solio paper face down. Replace the back of the frame and secure the springs. The back is hinged to permit of uncovering part of the print at a time to inspect it without destroying its register with the negative. The operation of putting in the sensitive paper must be performed in a subdued light, that is to say, in an ordinary room, as far as possible from any window. The paper not used must be kept covered in its envelope.



THE PRINTING FRAME.

The printing frame, when filled as directed, is to be laid glass side up in the strongest light possible (sunlight preferred) until the light, passing through the negative into the sensitive paper, has impressed the image sufficiently upon it. The progress of the printing can be examined from time to time by removing the frame from the strong light and opening one half of the hinged back, keeping the other half fastened to hold the paper from shifting. The printing should be continued until the print is a little darker tint than the finished print should be.

As soon as a print is finished place it in a drawer or box where it will be protected from the light until your batch of prints is ready for toning.

*When printing from glass plate negatives no glass is needed in the printing frame, the plate itself fitting into rabbet in frame.

TONING WITH THE COMBINED BATH.

Place prints without previous washing in the following combined toning and fixing bath.

- 2 ozs. Solio Toning Solution.
- 4 ozs. *cold* water.

Pour the toning solution into a suitable tray and immerse the prints one after the other. Five or six prints can be toned together

if they are kept in motion and not allowed to lie in contact. Turn the prints all face down and then face up and repeat this all the time they are toning. The prints will begin to change color almost immediately from reddish brown to reddish yellow, then to brown and finally to purple. The change will be gradual from one shade to another and the toning should be stopped when the print gets the shade desired.

Six ounces of the diluted toning solution will tone two dozen 4 x 5 prints ; after that a new solution should be made same as before.

When the proper shade has been attained in toning bath the prints should be transferred for five minutes to the following salt solution to stop the toning :

Salt,	-	-	-	-	-	-	1 oz.
Water,	-	-	-	-	-	-	32 ozs.

Then transfer the prints to the washing tray and wash one hour in running water, or in sixteen changes of water.

The prints are then ready for mounting or they can be laid out and dried between blotting papers.

If desired the amateur can mix his own toning bath, but in so doing should exercise great care in getting pure chemicals and using exactly the proper proportions.

STOCK SOLUTION.

A Hypo-sulphite of Soda,	-	-	-	-	8 ozs.
Alum (crystals),	-	-	-	-	6 ozs.
Sugar (granulated),	-	-	-	-	2 ozs.
Water,	-	-	-	-	80 ozs.

Dissolve above in *cold water*, and

When dissolved add Borax,	-	-	-	2 ozs.
Dissolved in hot water,	-	-	-	8 ozs.

Let stand over night and decant clear liquid.

STOCK SOLUTION.

B Pure Chloride of Gold,	-	-	-	7½ grains.*
Acetate of Lead (Sugar of Lead),	-	-	-	64 grains.
Water,	-	-	-	8 ozs.

*Or double the quantity of chloride of gold and sodium.

Solution B should be shaken up before using and not filtered.

To tone fifteen 4 x 5 prints take :

Stock Solution A,	-	-	-	-	-	8 oz.
Stock Solution B,	-	-	-	-	-	1 oz.

Place prints without previous washing into the above.

Tone to desired color and immerse prints for 5 minutes in following Salt Solution to stop the toning :

Salt,	-	-	-	-	-	-	1 oz.
Water,	-	-	-	-	-	-	32 ozs.

The extra fixing bath should be used to ensure *thorough fixing*.

After the salt bath give one change of cold water and fix for 10 minutes in the

EXTRA FIXING BATH.

Hypo-sulphite of Soda,	-	-	-	-	-	1 oz.
Sulphite of Soda (crystals),	-	-	-	-	-	60 grains.
Borax,	-	-	-	-	-	$\frac{1}{4}$ oz.
Water,	-	-	-	-	-	20 ozs.

Wash one hour in running cold water or in sixteen changes of cold water, when prints may be mounted.

The combined bath must be started cold, not above 50° Fahr., and must not be allowed to rise to temperature above 60° Fahr. This condition can be obtained by placing a piece of ice in the bath when toning. If the bath is too warm, you will get yellow prints with a greenish cast in the half tones.

Use a thermometer and keep it in toning bath all the time.

The combined bath is an acid solution. The borax neutralizes only the *excess* of acid in the alum. Any attempt to neutralize the bath will precipitate the alum.

The combined bath should not be used a second time.

Clean trays once a week with nitric acid or sulphuric acid and water to prevent white spots or blotches on the prints.

SEPARATE TONING AND FIXING BATHS.

Wash in 5 or 6 changes of water or sufficient to remove the free silver.

Tone in a plain gold bath, using about 1 gr. of gold to 48 oz. of water. Neutralize by adding a saturated solution of borax, bi-carbonate of soda or sal soda.

When toned, immerse prints in running water where they may remain until all are ready for the fixing.

If running water cannot be had put prints into

SHORT STOP:

Salt,	-	-	-	-	-	-	-	1 oz.
Water,	-	-	-	-	-	-	-	1 gal.

If there is a large batch of prints to be toned do not allow prints to lie in short stop solution, but put them into a tray containing clear water where they may remain until all are ready for the fixing.

FIXING BATHS.

Fix twenty minutes in

Water,	-	-	-	-	-	-	-	1 gal.
Hypo,	-	-	-	-	-	-	-	13 oz.
Solio Hardener,	-	-	-	-	-	-	-	½ oz.

To mix with Hydrometer, take water 1 gal., add sufficient Hypo to test 25 gr. to the oz., and add ½ oz. of Solio Hardener.

On account of its simplicity and cheapness, we advise the Solio Hardener Fixing Bath, but give the alum fixing bath for the benefit of those who prefer it.

ALUM FIXING BATH:

Hypo-sulphite of Soda,	-	-	-	-	-	-	-	6 oz.
Alum (Crystals),	-	-	-	-	-	-	-	2½ oz.
Sulphite of Soda (Crystals),	-	-	-	-	-	-	-	¾ oz.
Water,	-	-	-	-	-	-	-	70 oz.

When dissolved add ¾ oz. of borax dissolved in 10 oz. hot water.

This fixing bath must be made about 10 hours before use. As it keeps indefinitely before use it may be made up in large quantities.

After fixing in one of the foregoing baths, wash 1 hour in running cold water or in 16 changes of cold water, keeping prints separated so the water may have a chance to eliminate the chemicals.

DETAILS.


The toning bath should tone in 6 or 7 minutes.

Tone by transmitted light for the high lights and half tones only, paying no attention whatever to the shadows.

We recommend a neutral bath and advise the use of Squibb's red litmus to test with.

If the bath tones uneven or streaky, add water until it tones in 8 or 10 minutes, and make it slightly alkaline.

One gallon of fixing bath is sufficient for one gross 4 x 5 size Solio or its equivalent.

 Prints allowed to stand over night in water are liable to turn yellow ; they should therefore be mounted as soon as washed.

 To make Solio Hardener :

Chloride of Aluminum, - - - - -	3 oz.
Bi-Sulphite of Soda, - - - - -	2½ oz.
Cold Water, - - - - -	12 oz.
Put both chemicals in the water and shake until dissolved.	

SOLIO HARDENER POWDERS.

It is important that properly tested chemicals be used in mixing the Solio Hardener, as otherwise the desired results may not be secured. We, therefore, put up in convenient powder form, the amount of chemicals required to make 16 ounces of the Solio Hardener.

GLOSSY PRINTS.

Few amateurs care to go to the expense or trouble of burnish-
ing their own prints, but they can readily obtain a beautiful glacé
finish in a simple manner by drying prints on a ferrotype plate in
the following manner.

1. Clean the ferrotype plate with hot water each time it is used. Polish with a soft cloth until plate is absolutely free from dirt or specks of any description. Swab with a tuft of soft cloth or cotton batting, wet with a solution composed of benzine 1 oz., paraffine 10 gr. Rub dry with a clean cloth, and polish with a chamois skin or very soft cloth. Use a soft brush to remove particles of dust from plate.

2. Lay the wet print on the ferrotype plate. It must be in perfect contact to produce a uniform glossy surface. This contact is better secured by avoiding air bells in laying the print down than by endeavoring to expel them by heavy pressure—light rolling with a print roller (with cloth between) is all that is required—heavy pressure being liable to make prints stick in spots.

3. When surface is dry brush over the back of print (while still on the plate) with a thin solution of white glue.

4. When “bone” dry strip the print from the plate and lay the print on a mount, the face of which has been well moistened with a wet sponge.

5. Rub down with a dry blotter, then dry face up, free from dust.

NOTE.—Prints finished by the above process can be kept very nicely unmounted if so desired, the glue on the backs preventing curling.

MAKING BLUE PRINTS.

Print making on Ferro-Prussiate (Blue Print) Paper is simple in the extreme, no chemicals whatever being required. Make prints in the same manner as described for making Solio prints (see page 55), but continue until a shade darker than the finished print should be, then wash the print for ten minutes in clean water. The resulting picture is of a very agreeable, bright blue color on a white ground and is as permanent as the paper itself.

Blue prints should not be burnished.

PRINTING ON MATTE COLLODION PAPER.

Print until high-lights are almost invisible, as print will tone out in second bath.

Wash in 7 changes of water, 5 minutes in each change.

Tone in plain gold bath.

GOLD BATH.

Chloride of gold and Sodium, $\frac{1}{4}$ gr. Water, 8 ounces.

Add Borax to make bath slightly alkaline. *Test with red litmus paper. When bath is sufficiently alkaline the litmus paper will turn blue slowly.*

Tone until purple, then wash in 3 changes cold water.

PLATINUM SOLUTION.

Make up solution consisting of

Platino-Potassium, 15 grains. Water, 15 ounces.
Phosphoric Acid, U. S. P., $\frac{1}{3}$ oz.

PLATINUM BATH.

To tone take

Platinum solution, $\frac{1}{2}$ dram. Water, 8 ounces.

Tone until proper shade is reached.

Wash in 4 changes and immerse ten minutes in

FIXING BATH.

Saturated Solution Hypo-sulphite Soda, $\frac{1}{2}$ ounce. Water, 8 ounces.

Wash $1\frac{1}{2}$ hours in running water or in 18 changes of water, not less than five minutes in each change.

To obtain green or olive tones stop gold bath while prints still have reddish tinge and continue platinum bath until desired tone is secured.

PRINTING ON DEKKO PAPER.

For the amateur there is perhaps no more satisfactory printing process than that offered by the use of Dekko paper. Prints made by this process give soft platinum effects at a minimum of trouble and expense.

Although very rapid no dark room is required in handling Dekko paper. Printing may be done by either artificial light or daylight and the print then developed by subdued daylight or by lamplight. If daylight be used the amateur would simply pull down all of the window shades and having filled the printing frame in the usual manner, would step to the window, raise the shade a trifle, give the required exposure, pull down the shade and proceed with development. If exposure is made by gas-light one would turn up the jet to its full capacity for the required time and when ready for developing would simply turn the gas low so as to subdue the light, and could then work directly under it. To the amateur who has no regularly equipped dark-room this feature of the paper is a great convenience, as the bath-room or kitchen can be readily utilized for the work either by day or night without the necessity of pinning blankets over doors and windows to stop each stray ray of light.

When filling the printing frame the paper not used should be promptly replaced in its envelope and put away in a dark drawer.

EXPOSURE.

To print from a negative of average density expose two minutes, six inches from an ordinary six foot gas burner. A very thin negative will print in about one minute and a very dense one would require from four to five minutes but the average exposures will be from two to three minutes by this light. If exposed to direct sunlight an exposure of from one to five seconds will suffice.

As a general rule printing by artificial light will give better results, and after your first two or three experiments you will be able to judge by the appearance of a negative just how much time will be required for printing.

DEVELOPMENT.

Dekko paper does not print out, but the image is latent and must be developed the same as with a negative or a bromide print.

For your developer make up a stock solution as follows :

Amidol,	-	-	-	-	-	80 grains.
Sulphite Soda (crystals),	-	-	-	-	-	200 grains.
Water,	-	-	-	-	-	10 ozs.

To develop take,

Stock Solution,	-	-	-	-	-	1 ½ oz.
Water,	-	-	-	-	-	3 ozs.
10 per cent. Solution Bromide of Potassium,						3 to 5 drops.

Soak prints for a few seconds in cold water, then place face up in tray and pour on developer. If the print has been properly exposed development will be very rapid. The instant print reaches the required density it should be transferred directly (without washing) to the

HYPO BATH.

Hypo-sulphite Soda,	-	-	-	-	1 oz.
Acetic Acid, (or Alum ¼ oz.,)	-	-	-	-	4 drops.
Water,	-	-	-	-	5 ozs.

Keep print moving during first few seconds of immersion.

Wash thoroughly for one hour in at least 12 changes of water and hang up to dry.

Four ounces of the diluted developer will answer for half a dozen 4 x 5 prints, then it should be thrown away and new developer prepared from the stock solution.

ANOTHER DEVELOPER.

The following formula may be substituted for the Amidol formula recommended above when desired and will be found to give most excellent results.

HYDRO-METOL DEVELOPER.

Water,	-	-	-	-	-	-	12 ozs.
Metol,	-	-	-	-	-	-	7½ grains.
Hydrochinon,	-	-	-	-	-	-	30 grains.
Sodium Sulphite, crystals pure,	-	-	-	-	-	-	218 grains.
Sodium Carbonate, (Crys.),	-	-	-	-	-	-	163 grains.

Dissolve and add about 25 drops of a solution composed of Bromide of Potassium, ½ oz., water, 5 oz. This solution is to be used without diluting.

Olive green tones may be obtained by diluting developer with two to three ounces of water and adding 12 to 15 drops of the Bromide of Potassium.

Mount in same manner as described for bromide prints, page 103.

FAILURES AND THEIR CAUSES.

Weak prints are caused by under exposure or weak developer.

Over-dark prints are the result of too long exposure, or too strong developer.

Muddy whites are usually from lack of bromide in developer but may be caused by paper being light-struck, by forcing development of under-timed prints or by failure to move prints in hypo bath.

Greenish-brown tones are the result of too much bromide in the developer or of the use of old or weak developer.

Yellow stains come usually from insufficient washing or fixing but are sometimes the result of not completely immersing the print in developer or of not keeping them moving for a few seconds when first put into hypo.

Brown or purple stains sometimes result from incomplete fixing or from failure to keep prints moving in the hypo. The remedy is obvious.

White spots are the result of bubbles on the paper while in the developer.

COLOR.

The range of tone with Dekko paper includes olive green, blue black, brown black and a decided sepia. The olive green tone is easily obtained by using a slight excess of bromide in the developer. The blue black tone follows the use of a normal developer and normal fixing, while the browns and sepias are obtained by allowing the print to lie in the hypo-alum fixing bath from 15 minutes to an hour, according to the results desired.

TEXTURE OF DEKKO PAPER.

This paper is furnished in a variety of textures, although the emulsion is the same in all cases.

CARBON MATTE has a fine grain, velvety matte, cream tinted surface, which particularly adapts it to the production of results similar to carbon.

PLAIN MATTE is a fine, white, natural paper texture, matte-surface and is best adapted for the production of prints which it is desired should resemble regular printing-out matte-surface paper.

EGG SHELL MATTE has a matte-surface with slight sheen, which is calculated to please those desiring something between the high gloss and dead matte surface.

ROUGH MATTE is a rough matte-surface, which is best adapted for large prints or sketchy landscapes.

The difference between the four grades of paper enumerated above is entirely in the surface; the chemical effect, except as influenced by the surface and manipulation, is the same.

PLATINUM PRINTING.

Of all the modern printing processes at the command of the photographer, whether amateur or professional, none deserves to be more popular than the platinum. The simplicity of manipulation combined with the beauty of the results obtained with it, is enough to recommend it to every photographer. And above all, the prints produced by this method are as permanent as the paper which supports the image.

Its range of yielding the strongest blacks with pure lights and a long scale of intermediate half-tones or grays, is only equalled by the carbon process. The platinum print has an indescribable charm, suggesting atmosphere, though the negative printed on another medium may be entirely devoid of this valuable pictorial quality.

Notwithstanding these decided beauties and charms, the great majority of photographers, and especially beginners, imagine that platinum printing belongs to the advanced stage of photography.

Excluding the process of producing blue-prints, none is so easy and simple, and none requires so few chemicals and so little time and trouble to produce a finished print.

In printing, the image is only partially visible and it takes a little experience in overcoming the difficulty in judging how far to go. This factor has undoubtedly been the great bugbear of this otherwise almost ideal photographic printing process, and has been the cause which frightens the beginner who has generally accustomed himself to some of the printing-out silver papers. But in consideration of the fact that the difficulty is often more imaginary than real, and that the manipulations of developing, cleaning and washing hardly take more than a few minutes, is it not worth while to at least try this mode of printing?

The paper is manufactured in sheets 20 x 26 inches, but can be bought from any dealer in any desired size, packed in dozens in a

tin tube. The writer wishes to warn the beginner not to buy the paper in any way but in tins, for otherwise he will not receive the paper in proper condition. The advice of some dealers in this matter is ruinous. The paper is packed in tin tubes, as it is extremely sensitive to damp, which spoils it. Each tin contains a bit of cotton-wool, enclosing a small piece of asbestos, saturated with calcium chloride, which absorbs all traces of moisture apt to get into the tube, which would otherwise attack the paper.

In a fairly cool place it keeps for months. Excessive heat will deteriorate it rapidly, so that in a very hot climate it is best to keep it in a refrigerator.

Inasmuch as the paper is more sensitive to light than the gelatine and collodion silver papers in the market, it must be handled in subdued light, that is, not too near a window nor out of doors.

After opening a tube and taking out a sheet for printing purposes, pack away the balance exactly as originally packed, and the sheets can be kept until wanted.

The paper is exposed in the usual way to daylight, (sunlight preferably, according to the writer's opinion), and is examined from time to time to note the progress of the printing. This must be done with the back to the window. The image is only partially visible. A little practice will teach you how far to print; actinometers, as recommended by some, being entirely unnecessary. The developing is done by immersing the print in a solution of oxalate of potash which brings out the image in its full strength nearly instantaneously. It is then put directly into a weak solution of hydrochloric acid to clear it, and then washed. This is the outline of the process. Full particulars and detailed instructions are enclosed in every tube of paper.*

*[NOTE.—The development of "cold bath" platinotypes recommended by the manufacturers provides for the use of their own developer.

As soon as print is removed from developing dish it must be immersed face down for five minutes in the following bath: Hydrochloric acid, 1 part; water, 60 parts. Remove to a second acid bath for ten minutes and to a third for fifteen minutes. Wash fifteen minutes in at least three changes of water.

The sepia papers are similarly handled except that to each ounce of developer is added one sepia tablet (put up by the manufacturers of the paper) and developer is used hot: 150° to 160° Fahr.—ED.]

The paper comes in various varieties, which are marked as follows:

- * { AA (smooth, thin.)
- BB (smooth, stout.)
- CC (rough, very stout.)

These are the cold bath papers which are in general use here in the United States, and which give pictures of a black image.

Besides this class, the Platinotype Company manufactures the "Sepia" papers, which are developed hot, and give a rich brown print. They also come in the various varieties of smooth and rough.

The most popular of all these grades is that known as CC, it is a tough heavy paper, with a decided tooth or grain like a rough drawing medium. It also has better keeping qualities than any of the others.

It cannot be impressed too greatly upon the beginner that moisture is the greatest enemy of the process, and that it is necessary for him to keep printing-frames, pads and negatives bone dry, if he is aiming at superior results. For certain effects it is sometimes desirable to allow the paper to absorb some moisture, but this will hardly be in the line of a beginner. It is therefore to be recommended before starting a day's printing to dry the printing frames and pads in the kitchen or in some dry place, and even to dry the negatives if the air is laden with humidity. Gelatine is very hygroscopic, that is, readily absorbs moisture. It might also be pointed out that with paper which is old and perhaps slightly damp, printing need not be carried as far as with fresh and dry paper.

Most photographers have an idea that the platinotype process requires a so-called "plucky" and "brilliant" negative. This is not the case. Any negative which gives a good result with other papers will yield good prints with platinum.

As a beginning the tyro will do well to closely follow the instructions enclosed in every tube of paper. After having fully mastered all the operations, and feeling thoroughly at home in the

*See foot note, page 72.

manipulation of the paper, he may, if he so desires, sometimes alter the directions to suit special purposes.

In using the cold-bath paper, it is at times, advantageous to develop it *hot*. This can be done in case one is printing from a rather harsh negative, which if developed in the ordinary way would yield a print devoid of all gradation or half-tone. If developed *hot*, the same print will come out with considerably more softness, that is, yielding more half-tones.

In other words the temperature of the developing bath has a decided influence on the tonality of the print, as also on the color of the image.

The colder the bath, the colder the image may be set down as a rule. The warmer the bath, the warmer the image. Thus, one is enabled at will, to produce either a cold blue-black picture or one of a warm black, the resulting color depending entirely upon the temperature of the oxalate solution.

Dampish paper yields prints of a brownish black color, with a tendency to mealiness.

At times, it is desirable to increase the vigor of a print, and in order to accomplish that result the print must be developed in the following developer, recommended by Horsley Hinton :

Oxalate of Potash,	-	-	-	-	1 lb.
Phosphate of Potash,	-	-	-	-	4 ozs.
Sulphate of Potash,	-	-	-	-	½ oz.
Water,	-	-	-	-	6 pints.

This solution develops the prints rather slowly, and is especially suitable for prints from very flat negatives.

It may be remarked that although the Platinotype Company recommends its own developer for use with their paper, I have found the pure neutral oxalate of potash fully its equal. Their salts undoubtedly contain some phosphate of potash besides the oxalate.

Platinum prints may be toned in various ways.

The most common is the "Uranium" which changes the color to a rich brown or red-brown. The ordinary uranium intensifier

may be used for this purpose, the print simply being immersed in it for a time.

An excellent method for uranium toning is given by A. Horsley Hinton :

Solution 1.

Uranium Nitrate,	-	-	-	-	-	48 grains.
Glacial Acetic Acid,	-	-	-	-	-	48 minims.
Water,	-	-	-	-	-	1 oz.

Solution 2.

Potassium Ferricyanide,	-	-	-	-	-	48 grains.
Water,	-	-	-	-	-	1 oz.

Solution 3.

Ammonium Sulphocyanide,	-	-	-	-	-	$\frac{1}{2}$ oz.
Water,	-	-	-	-	-	1 oz.

For use take $\frac{1}{4}$ oz. of each, Nos. 1, 2 and 3, and 25 ounces water.

A finished unmounted platinotype print, thoroughly cleared from all iron salts, is placed in a flat dish and flooded with the above solution and the dish rocked continuously.

The color of the print will gradually change, the toning should be carried on a little further than when the desired tint has been reached, as the picture will dry out a little colder in color than it appears in the toning bath. It is now brought into a dish of water containing a few drops of glacial acetic acid. The water must not be alkaline, as it would dissolve the uranium compounds deposited on the print and thus change its color again. This property of alkaline water may be made use of in case the desired color of the toned print is unsatisfactory, and one wishes to get it back into its original condition.

It has, as yet, not been conclusively proven that platinum prints treated with uranium are permanent.

Besides the usual method of developing platinum prints, there is one which is especially fascinating for the more advanced worker who wishes to control every part of his print, that is by local development.

This can be accomplished by using the glycerine method, referred to in the platinotype instructions.

It consists essentially of painting the image by means of the oxalate solution, using a brush for the purpose, the paper having first been exposed to light under the negative in the ordinary way.

The method is so full of latitude, that prints have been produced by its means that look like fine wash drawings.

In short, it will be seen by the various matters referred to in this short résumé of the platinotype process, that it is beyond doubt the printing method *par excellence* for the amateur.

ALFRED STIEGLITZ.

NOTE—Since the foregoing article on Platinum printing was first published other excellent Platinum papers have been introduced, among them the American Platinum, manufactured by the American Aristotype Company.—[ED.]

EASTMAN'S **WD** PLATINUM PAPER.

Extreme simplicity of manipulation, pure platinum tones, absolute permanence and rapid printing are qualities which commend this paper to every amateur. It requires nothing but water and acid for the entire process of developing and clearing, yet is not only like platinum, but *is* platinum.

Print until shadows are a deep canary color and high lights are slightly visible. When printed, immerse print in hot water (110 degrees Fahr.) face up, sliding it in edgewise to avoid air bells. Development will require but a few seconds, after which the print is to be plunged into the

CLEARING BATH.

Cold Water - - 15 ozs. Muriatic Acid, c. p., - ¼ oz.

Soak print face down for five minutes each in two changes of Clearing bath. Wash for fifteen minutes in running water or in five changes of clear water, five minutes in each change.

Paper should be developed as soon as possible after printing—never later than the same day.

This paper is packed in tubes and should be kept dry and cool. What Mr. Stieglitz has to say regarding keeping and printing with ordinary platinum applies also to the Water Development paper.

THE SENSITIZING AND USE OF PLAIN PAPERS.

When I say plain papers I mean, of course, papers without a superficial coating of gelatine or albumen. In the choice of these for salting and sensitizing there is no restriction except that of chemical purity, and no difficulties in manipulation greater than will be met with in any other printing-out process.

Bromide "matt" papers do not come under this heading, since the gelatine surface is only made "matt," or free from glaze, by the use of starch, resin or other admixture in the coating of the paper. Platinotype is a typical example of a "plain" paper, and similar results may be obtained by the use of silver salts instead of platinum, with the additional advantage of a far wider range of color and texture than is possible in that process.

CHOICE OF PAPERS.

Your paper should be chemically pure and particularly free from iron spots (which, when the paper is sensitized, will spread out like asterisks), and at the same time it should be selected with your ultimate aim as to effect well in view. The purest I have found, next to "Rives," on which platinotype is coated, and for the matter of that most silver papers, too, is Whatman, which is sold in three grades, viz.: H. P., hot pressed or smooth; N., not, and R., rough, and then come Arnold, Harding and Hollingworth, all of which may be obtained from the principal Artists' Colormen without any difficulty and in various sizes. "Royal" measures 24 x 20 in. and Imperial 31 x 22 in.; and costs from 3d. to 6d. a sheet, according to its weight. These sheets can be cut up to the sizes you wish to print, allowing a little margin to handle them by in salting and sensitizing.

SALTING AND SIZING.

Having decided upon the paper you wish to use, a salting bath is made up as follows:

Common Salt,	-	-	-	-	50 to 100 grains.
Gelatine,	-	-	-	-	10 grains.
Water,	-	-	-	-	10 ounces.

But this again is a variable quantity, soft and porous papers requiring more gelatine to size them than hard, rough surfaces will take up. The bath should be used hot, so that it is thoroughly absorbed. The exact time of immersion—for the paper is put in bodily, not floated—does not matter, and it will be often found necessary to let the first sizing dry and then to give a second bath later on, that the pores of the paper may be well filled up.

You can salt half a dozen or more sheets at once, turning them over from time to time and then hanging them up by American or other wood clips to dry.

At this stage the paper will keep indefinitely, but it is as well to keep it under pressure that it may be easier to manipulate in the subsequent process of sensitizing. The stronger the salting the weaker may be the sensitizing, and there is room for considerable variation in both according to the character of the negative you are going to print from and the result you want to get.

The paper is now ready for sensitizing, and this is done on any of the ordinary silver baths used for albumenized papers, the standard being

60 grains Nitrate of Silver
to
1 oz. of Water (preferably distilled)
and
15 grains of Citric Acid.

This, with occasional strengthening, will last for a long time kept in a dark place in a stoppered bottle.

SENSITIZING.

Take your salted paper by the right hand corner and float it on the bath, using gentle pressure at the same time to exclude air bubbles (which would come out as insensitive spots in printing), leave it floating for 2 or 3 minutes, then hang up to dry in a moderately dark room until it is ready for use.

I have found it always better to sensitize paper slightly damp, since one can get a more even coating, and the edges do not curl up in the provoking manner common to papers when dry, but care should be exercised to avoid the sensitizing solution coming on to the back of the paper.

PRINTING.

This is done in the ordinary manner in a pressure frame, but the image may be taken rather darker than with ordinary albumenized papers to compensate for subsequent loss in toning and fixing. But be sure to varnish your negatives before printing, to avoid staining them. I cannot explain it, but the fact remains that although I have never had staining occur with albumenized papers, with the use of strongly salted and sensitized drawing papers, such an occurrence has been frequent, and although there are several reputed cures for such staining, I never yet found a satisfactory one.

TONING.

Any bath that will tone albumenized prints will act perfectly well with plain salted papers, but to obtain a rich red brown with what are called "juicy" depths in the shadows and undegraded whites in the high lights, use the following stock solution:

15 grains Chloro-platinite of Potassium
in
 $\frac{1}{2}$ oz. of Water.

Then, when you have prints to tone, take from it one dram mixed with 4 oz. of water with a few drops, say 5 or 6, of Nitric Acid.

This bath will be found to tone very rapidly and it will keep fairly well. Toning being completed, wash for a minute or two and neutralize your prints in a weak bath of Carbonate of Soda, they are then ready for fixing in the usual way.

FIXING.

Hypo-Sulphite of Soda,	-	-	-	4 oz.
Water,	-	-	-	20 oz.

I look upon thorough fixing as necessary to ensure permanency as is thorough washing in running water afterwards, and prints should be left in the fixing bath for at least 15 minutes before they are put in the washing trough, where they remain for at least a couple of hours.

I came across a print on plain "Saxe" paper done by my father at least 30 years ago and it is as fresh and bright as on the day it was made. It was a point with him to dab each separate print with a sponge under running water, back and front, for a considerable length of time, and I have never seen such little change in color of silver prints as are to be noticed in his.

When your prints are well washed, I take it that you have got as near to permanency as that unstable metal, silver, will allow, and although the directions for the manipulation of plain paper seem formidable enough, they are not really more so than would be required for the intelligent use and practice of any other printing-out process.

Still, for those who do not want the bother of preparing their own paper, there is one very much of the same grain and texture as platinotype, sold under the title of the "Blackfriars Matt."

I mention it with diffidence, since I am interested in it to some slight extent, but, as a matter of fact, I know of no other on the market, as that prepared by my old friend, Valentine Blanchard, has been withdrawn for some years, and another, known as "Mezotype," which was issued by the Carlotype Co., has suffered a similar fate. With this paper, which is a chemically pure one of

French manufacture, any tone, from warm red to black, can be obtained by the use of the platinum bath, and its approximate permanency is tolerably certain.

There is another method of obtaining prints on plain paper, which has been duly laid down by Lyonel Clark in his contributions to the *Camera Club Journal* of a few years ago, by developing an under-printed picture with a saturated solution of Gallic Acid or Pyrogallol Solution acidified with Acetic Acid. Mr. Clark also recommends the use of Arnold's pure unbleached paper in preference to any other. This is made of linen fibre instead of cotton rags and is free from chlorine or bleach in any form. Besides "Arnold," there is imitation "Creswick," which is rather more expensive, but of a fine color and texture for this kind of work. Being a heavy and thick paper (110 lbs. to the ream Royal) it requires considerably more gelatine in the sizing than Whatman, and I have sometimes found double sensitizing advantageous in obtaining strong prints.

There are again Joynson, Michallet and Ingres papers, all of which are suitable for salting, and some of the latter being in delicate tints open up new ground for photographic workers.

BERNARD ALFIERI.

CARBON PRINTING.

It is very doubtful whether any process so completely fills the requirements of the artistic photographer as does the carbon process. Its long scale, reproducing perfectly every gradation of the original negative, its permanence, its great variety of color, its wonderful transparency in the deepest shadows, and its adaptability to any surface, all combine to render it the most perfect of photographic printing methods. Sometimes, indeed, its very perfection is a barrier to its use. If we have to print from a flat, thin negative in carbon we shall certainly obtain a flat, thin, result, but for a negative with a very full scale of gradation, especially large and enlarged negatives, it is the process par excellence. Year by year it gains steadily in favor, and our exhibitions have greatly improved in general appearance by the variety of color it has given to their walls. In this short article it is my intention to give a brief outline of the process, embodying the salient points, which, if followed by the tyro, should ensure his success, but at the same time I would recommend him, after he has mastered the initial difficulties, to read some text book and make himself thoroughly acquainted with all the details and higher branches of the subject. Carbon Printing, as we know it to-day, is based on the fact that a mixture of gelatine, with a chromic salt, is gradually hardened and rendered insoluble on exposure to light. If, therefore, paper is coated with such a mixture of sensitized gelatine, containing any permanent pigment—Carbon was originally used, hence the name of the process—and if this paper is placed underneath a negative and exposed to actinic light, we shall have a positive image formed consisting of soluble and insoluble gelatine ; insoluble in exact proportion as the light has reached the surface of the pigmented

compound. Development consists in washing away with hot water those portions of gelatine which the light has not affected sufficiently to render insoluble. Now, without going more minutely into details at this stage and perhaps frightening the beginner with imaginary difficulties, I would assure him that the process only needs care, cleanliness and exactness at every stage in order to ensure success.

To those taking up Carbon Printing for the first time, a start should be made with the "Single Transfer Process." This is the simplest form and has some advantages over the "double transfer" because less manipulation is required, and, moreover, it is easier to produce prints on rough drawing papers by its means. The only objection to it is that everything becomes reversed; what was on the right hand side of the original is now on the left hand side of the print, but this is of little moment for purely artistic work. Of course, where enlarged negatives are required, specially for Carbon Printing, they are usually made reversed and such will give a true result after printing by the single transfer process. Eastman films may be printed through the film itself, i. e., with the celluloid side in contact with the "tissue"—as the pigmented printing paper is technically called—and the resulting print will render the picture in its correct aspect.

REQUIREMENTS FOR THE SINGLE TRANSFER PROCESS.

Carbon Tissue,	Thermometer.
Black Varnish or Lantern Slide	Alum.
Binders,	Actinometer.
Single Transfer Paper, a little	Blotting Paper.
larger than the negative.	3 Dishes (2 for cold water and one
A Flat Squeegee—not roller.	for Alum Solution.)
Squeegeeing Board.	1 Developing Tank or large basin
Bichromate of Potash.	to hold hot water.
Camel's Hair Mop Brush.	

SENSITIZING THE CARBON TISSUE.

Carbon Tissue is the name given to the paper coated with pigmented gelatine and may be purchased from the photographic stock dealers in almost any desired color. When insensitive, it will keep in a dry place almost indefinitely. Should the beginner be able to purchase it ready sensitized, he is advised to do so, because tissue sensitized in the making is usually manufactured from softer gelatine and consequently development is easier and quicker. Sensitizing is, however, a very simple operation, and if done at night the tissue is ready for use when dry the following morning and will keep in good condition for about a fortnight, although, when preserved in a calcium tin, such as is used for platinotype paper, its longevity is very greatly prolonged.

The sensitizing solution is made as follows :

Potassium bichromate,	-	-	-	-	1 oz.
Water,	-	-	-	-	20 ozs.
Ammonia,	-	-	-	-	5 drops.

The temperature of this solution should not be over 65°F. In summer it may be necessary to cool it with ice. A dish, somewhat larger than the tissue, should be filled to the depth of about one inch with solution. The tissue is now immersed in it, care being taken to avoid air bubbles as much as possible ; but, should they occur, either on the back or front of the tissue, they must be quickly removed by lightly brushing the surface with the camel's hair mop. The usual time for immersion is about three minutes, but this varies greatly according to the temperature of the solution. A good plan is to remove the tissue immediately it becomes limp, placing it surface side downwards on a squeegeeing board—a plain board covered with sheet zinc—and then removing the surplus moisture with a stroke of the squeegee. Should a squeegeeing board not be available, a sheet of plate glass forms an efficient substitute. The tissue is now raised from the board and hung up to dry by means of clips. The tissue does not become sensitive till nearly dry.

DRYING THE TISSUE.

The greatest care must be taken that this operation is carried out under suitable conditions, for after success depends very largely upon it. It is advisable to dry the tissue as quickly as possible and in an atmosphere free from all impurities. A properly constructed drying cupboard is very useful for the purpose, although an ordinary room in which the fire has been burning during the day and which has been darkened to prevent the entrance of white light, will do just as well, and tissue left there at night will be ready for use the following morning. Care should be taken not to expose the tissue to even the weakest actinic light, because it is more sensitive than silver paper, and, moreover, any light action set up, continues when the tissue is placed in a dark place. The tissue being quite dry, it is stored in a pressure box ready for use.

PREPARING THE NEGATIVE.

Negatives for carbon printing should be vigorous and full of gradation. Do not attempt your first print from a flat, thin negative. Each negative must be provided with what is termed a "safe edge." This is made by painting round the edge of the negative with black varnish, or by sticking a strip of black or yellow paper round the negative on the glass side. Commercial lantern slide binders are very convenient for this purpose because they can be affixed in a few moments. Without this safe edge there is great danger of the insoluble gelatine picture leaving its support during development.

PRINTING.—THE ACTINOMETER.

The negative being prepared we have only to place it in a printing frame, with a piece of the sensitized tissue in contact, and expose to daylight as in any ordinary printing process. Now as we are printing on a dark colored surface it is evident that we must have some means for calculating the necessary exposure. Instruments for this purpose are known as Actinometers, and any

of the commercial forms will be found quite simple in use after one or two trials. An alternative to their use is to take a negative of equal density to that we are printing in carbon, and, placing it in a frame with a small strip of Solio paper, expose the frames simultaneously to daylight. When the strip of Solio paper is printed to the "pretty" stage, i. e., lighter than it would be for toning, we may consider our carbon print is finished and ready for development.

If we pause for a moment to think of what has taken place during printing, we shall see that the image of insoluble gelatine lies on the surface of the pigmented film instead of in contact with the paper supporting it. It follows, therefore, that if we place the "tissue" in hot water, the gelatine between the image and the paper will be dissolved and the insoluble film forming the picture will float away and be lost. Of course this difficulty might be overcome by printing through the paper, but this procedure would give rise to other troubles. The grain of the paper, the long time taken in printing—even when the paper is oiled as suggested by Mr. Blanchard—and the loss in definition, are serious obstacles to the success of this method. The difficulty has been met in a simple manner. If the printed tissue is placed in water for a few moments and then brought into contact with a flat surface excluding air, it will adhere during development. We, therefore, prepare wood, paper or other material on which we desire to transfer our image, by coating it with a layer of insoluble gelatine. Single transfer papers, smooth or rough, white or tinted, may be obtained ready for use, but probably the ideas of the photographer lead him to sometimes require something different to the commercial article and he will prefer to prepare his own. For this purpose take :

Nelson's No. 1 Gelatine,	- - - - -	1 oz.
Water,	- - - - -	2 ozs.

and after letting it soak for some hours, dissolve by gentle heat. Add to this solution very gradually

Chrome Alum, - 20 grains dissolved in 2 ozs. water.
stirring vigorously all the time.

With a stiff brush or sponge the chromated gelatine is applied to the surface of the wood or paper and allowed to dry. Ordinary papers require two coats, but Whatman and other rough drawing papers should have three. Should Nelson's Gelatine not be procurable, any other make may be used in its place, but if they are harder the alum must be greatly reduced. Should Heinrich's Hard Gelatine be used, about four grains of Alum would be sufficient. A larger quantity might cause coagulation during mixing.

DEVELOPMENT.

The print being ready for development, we prepare two dishes of cold water, one dish of five per cent. Alum Solution, a tank or basin of hot water about 100°F., a squeegee and squeegeeing board. Taking a piece of the single transfer paper, rather larger than the print, we immerse it in one of the dishes of cold water for a few minutes. (Whatman and other rough drawing papers should soak for hours, or else be placed in the hot water developing tank for half an hour before use.) The printed tissue is taken from the frame and placed in the dish of cold water which contains the transfer paper, bubbles being carefully avoided. It usually commences to curl up and then gradually unfolds itself again. When nearly unfolded it should be brought into position, film downwards into contact with the prepared surface of the transfer paper. Lifting both tissue and transfer paper by the one edge, drag them out of the water over the end of the dish and lay them "tissue" side uppermost on the squeegeeing board. Now apply the squeegee vigorously to the back of the tissue in order to expel all the water between the two surfaces. The transfer paper with the adhering tissue is now gently lifted and placed between blotting boards and kept under slight pressure for about twenty minutes. At the end of this time, the transfer paper with the adhering tissue is placed in the tank of hot water at 100°F. In a few minutes we shall see small quantities of soluble gelatine exuding round the edges of the tissue. We now take one corner of the tissue and lift it right

away from the transfer paper. Unless it comes quite easily and without force, it should be allowed to soak longer. The tissue being removed, a dirty mass is seen on the single transfer paper. All we have to do is to leave this mass with the hot water till development is complete. It is well to have a sheet of zinc or glass on which to support the picture during this operation or the paper support may get damaged. Errors of exposure may be partially compensated at this point. Over exposed prints may be reduced by raising the temperature of the hot water to 120° or 130°F ; while under exposed ones should be left to automatically develop, face downwards, at a temperature of 90°F . When the print is developed, it only requires a rinse in cold water, immersion in the 5% Alum Solution for 10 minutes to harden the film and remove the bichromate salt, a final wash to remove the alum and the print is then hung up to dry by means of clips. When dry the prints may be mounted with any good mountant or starch paste.

DOUBLE TRANSFER PROCESS.

As pointed out earlier in this article, the foregoing method reverses the picture unless a negative has been specially made for single transfer in the first instance. For direct prints where reversal would be objectionable, we must use the double transfer process, which is quite as easy to work as the single transfer, but involves one more operation.

The additional materials required are,

Temporary Support, Final Support, Waxing Solution.

With this process the procedure is exactly the same as regards the printing and development, the only difference being that a temporary support takes the place of the single transfer paper. A flexible temporary support is manufactured specially for this purpose. If it cannot be procured, a sheet of finely ground opal will serve the purpose equally well, provided the print is to be finally transferred to paper or other flexible surface. Which ever is used,

the surface must be first prepared with waxing solution. This is composed of :

Yellow resin,	- - - - -	36 grains.
Pure bees-wax,	- - - - -	12 grains.
Ether,	- - - - -	2 ozs.

After melting the wax, add the resin and thoroughly mix, remove from the fire and add the Ether.

A small pool of the waxing solution must be poured in the centre of the opal or flexible temporary support, and this is then rubbed all over the surface with a piece of clean flannel. Allow to stand for a few minutes and then lightly polish with another piece of flannel. Directly the smell of the Ether has gone, the support is ready for use and may be kept in this condition.

The print being developed, alumed, washed and dried, on the temporary support, is ready for the final operation. We cut a piece of the final support, a paper somewhat similar to single transfer paper, but coated with a thicker couch of more soluble gelatine, and place it in a 2% Alum Solution about an hour before required for use. The print on its temporary support is now immersed in tepid water, 70°F.; the final support is withdrawn from the Alum Solution, lowered into the tepid water, avoiding bubbles, so that the gelatinous side comes in contact with the print. The temporary and final supports are now withdrawn from the water together, placed on the squeegeeing board, the final support being uppermost, and brought into perfect contact by the vigorous action of the squeegee. When perfectly dry, the print will leave the temporary support without difficulty, indeed if dried in a warm current of air it will probably fall off without our aid.

Where opal is used, it may be necessary to insert a knife at the edge of the print. The temporary supports are not damaged by these operations and may be used for a large number of times, if waxed after each time of using.

In conclusion, I would urge every serious photographer to master this fascinating process, for, till he has done so, he must be unaware of many of the possibilities of his art.

JAMES A. SINCLAIR.

THE GUM-BICHROMATE PROCESS.

When a photographer has had the courage to go through some technical article on the working of a new printing process he feels the joyous conviction that on following closely the author's instructions he will be able to produce a good print by the process as described ; at any rate he knows beforehand what qualities this standard print ought to have. I do not see the way to produce this happy confidence in the present case, for although I think I am capable of giving a definition of what a good albumen or gelatino-chloride print ought to be, by comparison with a bad one, I am quite unable to define *the* good gum-bichromate print, and no instructions of mine will enable even an ardent worker to produce what a true artist will call a good gum-bichromate print. All that I can do is to enable him to produce a sheet of coated paper, the coating of which will dissolve and disappear in the places where light has not caused insolubility, while in other parts this coating will remain more or less adherent, according to the quantity of light admitted.

This is the definition of the process in a nut-shell : What we want is a film—a colored coating which, after exposure to light under a negative, will give us a surface quite soluble in some parts, partly soluble in others, totally insoluble in the rest. If we succeed in manufacturing this sheet of coated paper we shall have in our hands the foundation of a good gum-bichromate print—it rests with us to make a picture out of this, or a daub, or simply a commonplace, faithful, photographic print.

For in the gum-bichromate process we cannot work with the same standards as in other processes. For example, in the silver printing process, under-exposure gives a very bad print of a dirty color without strength or contrast. With gum-bichromate, consid-

erable under-exposure means total absence of image. One cannot say that the print is a bad one, for in this case there is no print whatever, all the coating will disappear in the developing. Similar with great over-exposure ; in this case the paper remains just as it was before printing—a dull surface of black, brown or red. But whenever an image has been developed and has remained on the paper the resulting print may be good, for it can be made into a picture and a fine picture, too, if the man who works at it is an artist and knows what he is about.

My meaning is that if the color used for coating is well chosen and sufficiently deep, its nature will not be affected subsequently as it is by toning or developing from white to black in other printing processes, so most of the conditions which cause failure in silver chloride, bromide or in platinum papers are not to be taken into account with this special method, for color and depth of color have both been chosen before printing and development. In other words, as we work from dark to light, the conditions of ordinary printing are naturally reversed. What we aim at is to keep the color that we have already applied instead of striving to build it up.

The materials are simple : Gum Arabic, Bichromate of Potash, and the cheapest of all pigments—earths. The gum need not be pure white gum, the ordinary red Gum Arabic works just as well as the purer samples. I have tried both and found no difference whatever in the results. Bichromate of Potash can be had of any druggist. Any sort of paper is suitable provided it is sized ; all drawing and water-color papers are good, so are most writing papers, but highly glazed paper is most difficult to coat properly, though it works well when this difficulty has been surmounted.

Powdered colors may be used successfully—they are cheaper than moist tubes, but they are not ground so fine. To make the three conventional tints of monochrome work, the following colors are necessary :

Lampblack, umber and burnt umber, sienna and burnt sienna, Vandyke brown, bistre, yellow and brown ocre, red ocre, brown red, Venetian red, indigo. These colors are permanent. They

can be mixed in different proportions according to the taste of the worker. No colors should be used pure, the result is generally displeasing.

A saturated solution of Bichromate of Potash (10%) is made with hot water and another of gum arabic and cold water which has to be worked up to a density marking 18 to 20 degrees by the saccharometer or densitometer. The Bichromate solution keeps indefinitely. The gum solution turns acid after a few days and seems to give better results in this state. If it thickens by evaporation or gets thinner by fermentation, a small quantity of water or a denser solution must be added until it registers a new 18 to 20 degrees. Ten cubic centimetres of this gum solution are mixed with pigment and four cubic centimetres of Bichromate are added to the gum and pigment. It must be understood that these measures are purely approximate. According to the depth of color or to the nature of the pigment more or less gum or more or less Bichromate will have to be added. The photographer will be guided by the behavior of the sensitive mixture which must allow of rapid and even coating. For example, if he uses Venetian red as pigment the resulting mixture will be thin compared to a mixture prepared with Vandyke brown, for the coloring power of the first pigment is greatly superior to that of the latter, consequently there will be much more pigment in bulk in the second case than in the first and a few drops of Bichromate and one or two drops of thin gum will have to be added. In reality every proportion is constantly varying in this process, the only important and unvarying factor should be the thickness of the sensitive mixture, for smooth and even coating is a necessity, and only a certain thickness will allow of proper coating. This is a matter of experience to be acquired by a few preliminary trials, though I have worked at the process for several years and it is rare indeed when I do not find it necessary to thicken or dilute the sensitive mixture before beginning to coat.

Now two methods of working are open to the photographer, either he may sensitize his paper in a ten per cent. solution of

Bichromate by immersion during one or two minutes, dry, and then coat with 'gum and pigment, adding to the mixture a proportion of water equal to the quantity of fluid that the Bichromate solution would have brought if it had been added to the gum and pigment, or he may coat his paper direct with gum, pigment and Bichromate in the proportions described above. In both cases the degree of thickness of the mixture must be tried before coating, and this operation must only be performed when the mixture has shown a satisfactory behavior under this preliminary trial. It is not difficult to judge. A mixture clinging to the brush and forming ridges which cannot be softened by repeated brushings must be diluted—while if it runs over the paper, refuses to set and follows the brush in waves, gum must be added.

I do not say anything about the proportion of pigment—this is a question of personal taste.

Coat your paper in full diffused light or by bright gas light. Pin the dry sheet on a drawing board, take a flat hogs-hair brush (the fan shape seems to be the most convenient) smear the surface roughly with the sensitive mixture, taking care not to use more than is necessary for the complete covering of the sheet, or else the coating will be too thick. This rough coating is covered with ridges and irregular brush marks; do not let the marks set but take up a goats-hair softener and give a few strong downward vertical strokes which will change the irregular ridges into vertical parallel lines—break these lines by several horizontal strokes perpendicular to the first—the lines will merge into one another and disappear. A few rapid and light touches here and there will finish the operation, which ought to be rapid and decisive.

Pin the paper up to dry in a dark place—absolute darkness is not necessary—and when bone dry, expose.

Correct exposure, I mean the right exposure for the desired effect, is the delicate point of the process. It can only be got at by comparative trials. I have seen men disgusted by their constant failures, who, as I found out later on, had never made these comparative trials on the same negative. They had tried every

possible change in their way of coating and their proportions of mixture, but had never had the idea of trying two exposures—one of ten minutes and one of two hours—to ascertain how gum-bichromate paper acted under extremes. It is, notwithstanding, the only sure way. An actinometer is necessary, of course, and the bands, numbered, may be kept for future reference.

The average exposure in summer by diffused light for a thin negative would be twenty minutes to half an hour. Length of exposure is influenced not only by the quality of the light, the color and density of the negative, but also by the thickness of the sensitive coating. It is of course in direct ratio to this thickness.

To be able to fully understand the importance of control in the development of a gum-bichromate print we must realize that the film or coating on which we are going to operate is composed of a substance uniform in appearance, but entirely soluble or semi-soluble in some parts, and insoluble, or nearly, in others. If we immerse this coated paper in a dish of water and let the solvent act undisturbed on the whole surface of this coating, it will dissolve it proportionately to the extent it has previously been rendered insoluble, and it will give us a positive duplicate of the original negative. If, on the contrary, we apply the solvent irregularly to different parts of the coated paper, if we use hot water there and cold water there; if, going even further in our personal intervention, we add local friction to the dissolving action of water locally applied, we produce a positive which has not been developed in proportion to its solubility, but proportionately to the temperature of the agent used in developing and to the force and frequency of its application—consequently it is not a duplicate of the original negative as to tone and values, but the result, good or bad, of our own judgment.

In reality the technical or photographic part of the process is at an end when development begins. Development requires no chemicals, and no formulæ to mix them. All you have to do is to wash away, rub away, or scrape away, according to your mood, the more or less soft pigment attached to the paper. You can

develop in ten minutes or several hours, wash away one side of your picture before developing the other, work with a brush, a spurt of water, or a gentle flow. So there are no rules for developing save those by which artists of all crafts ought to be guided.

The only indications which could be useful to a beginner are the following : Always develop the print out of the bath of water ; if it is immersed it stands to reason that local development is impossible. Place the sheet of paper on a glass plate propped up at one end by some sort of wooden contrivance, the other resting on the bottom of the developing tray. Always begin by cold water, and never use higher temperatures until you have ascertained that a low temperature has no effect whatever. Develop slowly, and do not let an ounce of water flow over the film without a definite intention calculated to produce a definite effect. If hot water does not reduce the heaviest shadows use a very soft, flat sable brush, but not until the print is completely developed in other parts—then work carefully, and bear in mind that the deepest blacks are the foundation of your picture, and that should they be over-reduced the whole balance of the composition will be upset. Do not imagine that after having successfully (from a technical point of view) developed a gum-bichromate print you have got all that you can get out of the negative ; print another proof and yet another—try different exposures, modify the temperature of your bath, change the scheme of tone, use another batch of paper coated with a mixture of different proportions, and you will be astonished at the variety of effects thus obtained—each one, though quite different from the others being able to give a true and pleasing impression if the relative values have been kept in harmony in the various schemes of tones adopted.

Failures may be divided into four classes.

1. The coating is completely washed away in a few minutes or after being successfully developed, seems to lose all cohesion and instead of drying, melts and spreads, ruining the print absolutely—cause, under-exposure.

2. The coating is absolutely insoluble or only a trace of image is visible—over-exposure.

3. Development proceeds normally but the whites are stained or marked with granular spots of color.—(1st case) color-stained whites, cause: excess of liquid, Bichromate or water in the sensitive mixture. (2nd case), granular deposit, cause: excess of pigment.

4. The coating, on developing, breaks into scales. Cause: extra thick film to which extra exposure has not been given. We must not forget that the time of exposure is regulated not only by the color and the density of the negative and the amount of actinic light, but also by the degree of thickness of the coating. A thick coating will always produce scaly development when the same exposure has been given as if the coating was of normal thickness.

Gum-bichromate prints may be dried before a fire or over a gas stove, if the color does not exhibit any symptoms of spreading. If it is in the least tender, accelerate evaporation by fanning. As a rule, however, I prefer to let the print dry naturally, for many successful alterations in value can be made when the coating has thickened somewhat and is less delicate under the brush.

The prints when quite dry must be passed for a few minutes in a clearing bath of water and bi-sulphite of soda (1%) to eliminate the last traces of Bichromate.

Is it useless to add, before finishing, that we do not consider a photographic print to be beautiful simply because it is printed by the gum-bichromate method. We like the process and we are doing our utmost to popularize it, only because it allows of great control over tones and values and because in the hands of men who have acquired and cultivated artistic vision it can give an astonishing range of varied effects. The opening paragraph of this article may have seemed paradoxical to the reader at first sight ; if he has gone through the whole of it he will acknowledge that success in the technical part of the process lies solely in the manufacturing of a sheet of coated paper, the coating of which is able to disappear in certain parts only under the action of washing or friction, while other parts retain their color. This paper will give us an image, but it is the artist who will "do the rest." He will make the picture.

ROBERT DEMACHY.

ENLARGING ON BROMIDE PAPER.

The Amateur who has learned to properly develop his negative will find little difficulty in the handling of Bromide paper. There is nothing complicated in the enlarging process ; development is simple and easy.

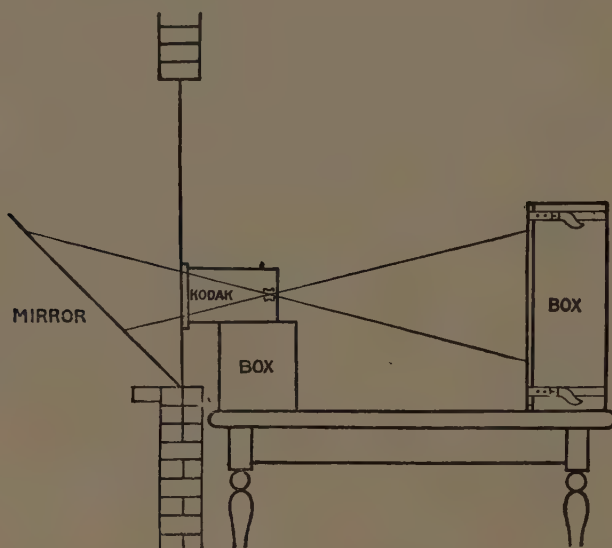
Bromide paper, unlike the comparatively slow printing-out papers, cannot be handled in daylight, but must be as strictly guarded from white light as a film or glass plate. In nature it is similar, in fact, to films or plates as the image appears only with development.

It is not generally known that large and beautiful pictures can be made from amateur negatives, and it is still less understood that these can be made by the amateur himself and without additional apparatus other than one or two large dishes for developing ; in other words, the camera can be pressed into service as an *Enlarging Camera*, and play a part for which in the first place it was not intended.

The process is so very simple and so inexpensive that we anticipate a great popularity for it. All that is required is a small room with a window, preferably facing the north, through which the light can come without being obstructed by any building or trees. All light should be excluded by means of a wooden shutter to fit the window frame (brown paper answers equally well secured by drawing pins). In this shutter an opening should be cut somewhat larger than the negative to be enlarged from. On either side of the opening arrange grooves in which to slide the negative. If the enlarger is so fortunate as to have a room with a window high enough to escape surrounding objects and have a sky back-ground, it will not be necessary to use a reflecting mirror ; should, however,

the window not look directly upon the sky, a mirror 30 inches long by 24 inches wide, at an angle of 45° . should be arranged outside the window so as to throw the light above on to the ground glass, of which we speak below.

If a film negative is to be enlarged from, it must be placed between a piece of ground glass and a piece of plain glass, the ground surface being on the outside and the film side of the negative being next to the plain piece of glass. The negative should then be placed in position with the ground glass next to the light. The negative should be inserted upside down, thereby giving an upright image on the screen.



Folding cameras, having an opening the full size of the negatives they make, are especially adapted to use as enlarging cameras. Simply place the back of the camera to the opening containing the negative (first, of course, removing the ground glass, etc., from the camera) and focus by moving the lens back and forth in the usual way. The Cartridge Kodaks are especially adapted to use in this way.

On a table or shelf, adjusted below the opening in the window, place your camera, having first removed the roll-holder part, so as to leave the back quite open. The camera should be placed in such a position that the back of it covers the negative and with lens pointing toward the easel.

The only other article now required is a support for carrying the sensitive paper during the exposure. If an easel capable of being placed perfectly perpendicular is at hand, that will best answer the purpose, but an ordinary drawing board strapped to a box of suitable size and placed upon the table will answer very well.

Having covered this drawing board with a sheet of white paper, open the shutter of the camera as directed for time exposures, when you will see the image of the negative projected upon the paper. The easel will have to be moved until the enlargement is of the desired size, and the focusing done on the plain sheet of paper by moving the camera backward and forward, or by using the focusing arrangement. Focus with the full aperture of the lens, but before exposure place the second or third stop in position.

The only light that should now enter the room should be that passing through the negative and through the lens. Should any light escape between the camera and the opening in shutter, a focusing cloth can be thrown over to keep it out.

Everything is now ready to make the exposure, and having secured a sharp image of the proper size, place the cap upon the lens, or throw a focusing cloth over it to exclude all light, and then on the plain paper used to focus upon, place the sensitive paper by pinning the corners to the board, care being taken that the paper is lying flat.

NOTE: The No. 2 Bulls-Eye, the No. 2 Bullet, No. 2 Bulls-Eye Special, No. 2 Bullet Special and Folding Pocket Kodaks will make perfect enlargements but the focusing must be done by moving the camera itself backward and forward, thus requiring a little more care and trouble in perfecting an arrangement which will be perfectly light tight.

No hard and fast line can be laid down as to the correct time of exposure, as the light is constantly changing, so it is advisable for a beginner to make a test exposure upon a narrow strip of the paper he proposes to use, placed diagonally across the focused image. Having covered up three-fourths of this strip, remove the cap from the lens and give an exposure of one-half minute, then uncover another fourth, which will leave half the strip exposed, and give

another half minute's exposure. Repeat the operation with the remaining two-fourths and then replace the cap on the lens. It will be evident that this test strip has now received four different exposures. The first fourth exposure has now had two minutes, the second one and a half, the third one, and the last portion 30 seconds. Upon developing this strip it is easy to judge which, or between which of these exposures is correct.

It will be a very dense negative that will require an exposure exceeding two minutes, and a very thin one that will need less than 30 seconds, if any of Eastman's Permanent Bromide Papers are used.

Having ascertained the time necessary, pin a piece of the Bromide paper of the desired size to the face of the easel, being careful to have it lie perfectly flat. Open the lens and give the proper exposure. Close the lens. The enlargement is now ready for development as described on page 98.

The time of exposure required in making an enlargement on Bromide paper is necessarily uncertain, especially when daylight is used, and is dependent on many circumstances.

1. The intensity of the light.
2. The strength or density of the negative.
3. The size of the enlarged picture.
4. The size of the camera.
5. The size of diaphragm or stop used in the lens.
6. The Bromide paper used.

The amateur must not be appalled by this seemingly formidable array of conditions, and need not for a minute despair of ever judging correctly in every instance.

While it is true that in order to obtain the very finest results, a knowledge of all these is necessary—and such a knowledge as can only come to one by careful observation and practical experience—perfectly satisfactory pictures can be made by the beginner. A very few trials will narrow the exercise of judgment down to the intensity of the light.

VIGNETTING. The operator standing at the left of and half-facing the easel should screen the lens with a piece of straw-board about 16 x 20 inches, having a hole of proper shape for the vignette cut in the center. Having uncapped the lens the vignetter should be moved back and forth from the lens towards the easel so as to allow the head and shoulders of the image to appear on the screen. The movement out should be sufficient to show the image almost to the edge of the kit, and in far enough to cut close to the head and shoulders. This movement to and fro should continue through the entire exposure, which should not be less than twenty or thirty seconds, the lens being stopped down, if necessary, to get sufficient time to operate the vignetter.

To get a soft, evenly blended vignette requires some little practice, but the knack once acquired it becomes quite easy.

EXTRA PRINTING. Faces and light drapery often require, to get detail, extra time in exposure. This is accomplished by using a card having a smaller aperture after using the vignetting card, and passing it over the portions requiring the extra time. By keeping the spot of light moving almost any amount of additional detail may be obtained locally. Occasionally in a half or full length subject, a hand may require *less* exposure than the rest of the picture; in this case a small piece of cardboard, cut to the proper shape and stuck on the end of a knitting needle, can be used to screen that part of the image.

The paper lends itself to innumerable dodges which may be practiced in a similar manner, the operator being able to see just what he is doing from his position near the easel.

SOFT EFFECTS IN ENLARGEMENTS.

Wonderful softness and breadth can be obtained in enlarging on Royal Bromide paper by making the enlargement *through a silk bolting cloth screen*. The screen breaks up the intensity of the blacks, adds to the breadth of the half tones and when prints so

made are given a sepia tone as described on page 108 they have the appearance of rare old etchings. The screen can be most conveniently used by stretching on a strainer or frame.

The screen may be used in direct contact with the paper, in which case the enlargement has the effect of being made on fine meshed canvas, or greater diffusion of light may be given by placing the screen at a distance of about $\frac{1}{4}$ inch from the paper; the farther the screen is removed the greater the diffusion of light. The use of the screen increases the length of exposure about one-third.

With "smooth" paper the fine mesh or medium bolting cloth should be used. With "rough" paper use coarse mesh.

Silk bolting cloth for this purpose can be obtained at any Kodak dealers.

DEVELOPMENT.

Having made the exposure the next step is to develop the picture. The process being much the same as in the development of a negative, most of the articles required will be already in the outfit of the amateur who does his own developing and printing.

HYDROCHINON DEVELOPER.

Provide the following articles :

- 1 Dark Room Lamp,
- 1 Glass Beaker,
- 1 doz. Hydrochinon Developer Powders,
- 1 oz. Bromide Potassium,
- 1 lb. Hyposulphite Soda,
- 1 Stirring Rod,
- 3 Hard rubber or rubber lined trays of sufficient size to contain the largest enlargements which you propose to make.

Any one can make a rubber lined tray by gluing a piece of gossamer cloth to the inside of a wooden tray of suitable dimensions.

NOTE.—The following directions are for developing a $6\frac{1}{2} \times 8\frac{1}{2}$ print but it should be borne in mind that enough of any solution should be used to fully and quickly immerse the print.

1. Fill one of the trays nearly full of water and put the exposures into it one by one, face down, put them in edgewise ; to avoid air bells, and immerse them fully.

Cover the tray with a bit of brown paper to keep out the light from the lamp.

2. Open one of the developer powders and put the contents (2 chemicals) into the beaker and pour in 4 ounces of water, (up to the ring with an Eastman beaker). Stir until dissolved with the stirring rod.

3. Take one of the exposures from the water and lay it, face up, in the second tray, and pour upon it the developer. Rock it back and forth to prevent streaks and air bubbles. In about 2 minutes it will begin to darken in spots, representing the shadows, and in about three minutes the operator will be able to distinguish objects in the picture. The developer should be allowed to act until the picture is of the required depth.

4. Transfer the developed enlargement to the third tray and rinse two or three times with water, leaving it to soak while the next print is being developed.

Four or five $6\frac{1}{2} \times 8\frac{1}{2}$ pictures can be developed one after the other in one portion of developer, then it should be thrown away and a fresh portion mixed. If the pictures are larger a proportionately less number can be developed with each fresh batch of developer.

As each successive print is developed it should be put, with the preceding prints, in the washing tray and the water changed twice, to prevent the developer remaining in them from staining them. Then place in the fixing bath.

5. All the exposures having been removed from the first tray, put six tablespoonfuls of the Hyposulphite of Soda into it, fill two-thirds full of water and stir until dissolved. This is called the fixing bath.

6. Immerse the prints one by one in the fixing bath and allow them to remain about ten minutes.

7. The yellow shade can be removed from the lamp as soon as all the exposures have been developed and fixed.

8. After fixing, wash thoroughly for two hours, in at least twelve changes of water, and hang up to dry. The fixing solution must only be used in one tray. Neither must any of the fixing solution be allowed to touch the paper, through the agency of the fingers, or otherwise, until it is ready to go into the fixing bath.

OXALATE DEVELOPER.

For use with any of the Eastman Bromide Papers except "Royal."

Those who wish to mix their own developer will find that the following gives excellent results :

FORMULA.

No. 1.

Oxalate of Potash,	-	-	-	-	8 ozs.
Hot Water,	-	-	-	-	24 ozs.
Acetic Acid (or Citric Acid $\frac{3}{4}$ oz.)	-	-	-	-	1 $\frac{1}{2}$ drams.

No. 2.

Proto-Sulphate of Iron,	-	-	-	-	8 ozs.
Hot Water,	-	-	-	-	16 ozs.
Acetic Acid (or Citric Acid, $\frac{1}{8}$ oz.)	-	-	-	-	$\frac{1}{4}$ dram.

No. 3.

Bromide Potassium,	-	-	-	-	$\frac{1}{2}$ oz.
Water,	-	-	-	-	16 oz.

These solutions keep separately, but must be mixed only for immediate use. They are to be used cold.

TO DEVELOP.

Take in a suitable tray—No. 1, 3 ounces ; No. 2, $\frac{1}{2}$ ounce ; No. 3, $\frac{1}{4}$ dram.

Soak the exposed print in clean water until limp, then pour off the water and flood with the developer, taking care to avoid bubbles.

With Platino and Matte-Enamel gently brush face of print with tuft of cotton while it is immersed to prevent bubbles. *This is important.*

The image should appear slowly, and should develop up strong, clear and brilliant. When the shadows are sufficiently black pour off the developer and flood the print with the

CLEARING SOLUTION.

Acetic Acid,	- - - - -	½ dram.
Water,	- - - - -	16 ozs.

Do not wash the print after pouring off the developer and before applying the clearing solution.

Use a sufficient quantity to flow over the print, say two ounces for an 8 x 10. Allow it to act for one minute and then pour it off and apply a fresh portion ; repeat the operation a third time, then rinse in *four* changes of pure water and immerse for ten minutes in the

FIXING BATH.

Hyposulphite Soda,	- - - - -	3 ozs.
Water,	- - - - -	16 ozs.

While in fixing bath move prints about five or six times to insure even action of hypo.

After fixing, wash thoroughly two hours, in at least twelve changes of water and hang up to dry. Use fresh developer for each batch of prints. With a glass bottomed or rubber lined tray, seven ounces of developer are sufficient for a 25 x 30 print.

OBJECT OF CLEARING SOLUTION.

The object of the clearing solution is to prevent the precipitation of the iron from the developer into the fibre of the paper. This can only be done by keeping the paper acid while washing out the developer.

Citric Acid may be used instead of Acetic in the clearing solution, in which case use $\frac{1}{8}$ ounce to the quart of water. Citric Acid is less liable to cause blisters.

Blisters sometimes appear in Bromide Paper, and may be avoided by using a little common salt in the first washing water after fixing. The hypo must not be stronger than three ounces to the pint of water.

NO TONING REQUIRED.

With Bromide Paper the final tones are obtained entirely by development, and range from a soft gray to a rich, velvety black, depending somewhat upon the density of the negative and the quality of the light used for printing.

CLEAN DISHES, CLEAN HANDS.

The faintest trace of Hyposulphite of Soda or of Pyrogalllic Acid is fatal to good results with Bromide Paper, and the operator cannot be too careful to avoid any contamination. The tray used for developing with oxalate should never be used for anything else.

To avoid yellow prints four things are absolutely necessary.

First—The developer must be acid.

Second—The clearing solution must be used as directed.

Third—Fresh Hypo solution is required for fixing each batch of prints.

Fourth—The washing must be thorough after fixing.

AMIDOL DEVELOPER.

The following formula is especially recommended for use with the Royal Bromide paper and may, if desired, be used with any of the others.

Directions for using

CONCENTRATED SOLUTION.

The concentrated stock-solution is prepared by dissolving in succession in

12 ozs.	-	-	-	-	-	-	Water.
3 "	-	-	-	-	-	-	Sodium Sulphite, Crystal.
½ "	-	-	-	-	-	-	Amidol.

Enough of this stock-solution should be prepared at one time for one day's use.

TO DEVELOP.

Take in a suitable tray :

Concentrated Stock-Solution,	-	-	1½ ozs.
10 per cent. Solution, Bromide of Potassium,			8 drops.
Water,	-	-	6 ozs.

Use cold. After exposure, soak the paper in water until limp and brush lightly over the surface while wet with a tuft of cotton; then flood print with the developer.

The image should appear slowly and should develop up *strong, clear and brilliant*. When the shadows are sufficiently black, pour off the developer and rinse the print thoroughly with pure water. If the print has been over-exposed a small additional quantity of a solution of Bromide of Potassium should be used as a restrainer.

NOTE : The above developer can be used over by the addition from time to time of some fresh developer. If, however, the restrainer solution has been added to it the developer should not be used again except for prints that are known to have been over exposed.

Immerse prints for ten minutes in the

FIXING BATH.

Hyposulphite Soda,	-	-	-	3 ounces.
Water,	-	-	-	16 ounces.

After fixing, wash thoroughly two hours and hang up to dry.

MOUNTING ON CARD.—Bromide Prints may be mounted wet or dry ; the prints should not be dried between blotters like chloride paper, but should be hung over a line, or laid back down upon glass or clean paper. To mount, brush over the back with thin starch paste, lay the print on the mount and rub into contact with soft cloth.

Prints on Enameled paper may be rolled or burnished or dried on ferrotype plates in same manner as described for Solio on page 60.

For burnishing, the print *must be quite dry*, and a dry lubricator used, Castile soap answering for that purpose.

“C” paper and the Royal Bromide papers are intended to retain their *rough* surface and should not be rolled.

FLEXIBLE PRINTS.—Permanent Bromide prints soaked in a mixture of glycerine, five ounces and water twenty-five ounces, and dried, will not curl, and may be used for book illustrations unmounted. The heavier papers, "B" and "C," are especially adapted for this purpose.

STRAIGHTENING UNMOUNTED PRINTS.—After drying, prints may be straightened by the scraping action of a sharp edged ruler applied to the back; the corner behind the ruler being lifted as the ruler is passed along.

OTHER DEVELOPERS.

Hydrochinon,
Amidol,
Eikonogen,
Para-Amidophenol.

Any of above may be used to develop *Eastman's Bromide Papers*, formulas for the use of which accompany the chemicals.

CONTACT PRINTING.

WITH PERMANENT BROMIDE PAPER.

LIGHT.—In contact printing with *Bromide Paper*, the exposure is preferably made by artificial light to insure uniformity, and to avoid over-exposure. Place the paper in a printing frame in the same manner as when using Solio or other printing-out papers.

SENSITIVENESS.—*Bromide Paper* is about one-twentieth as sensitive as a good dry plate or film and should be exposed accordingly.

EXPOSURE.—The exposure varies with the intensity of the negative, and the quality and intensity of the light, but may be approximately stated to be, using as thin a glass or transparent film negative as will make a good print, one-quarter second by diffused daylight, or ten seconds at a distance of one foot from a number

two kerosene burner. Very thin negatives should be printed by weak yellow light, like that obtained from a kerosene lamp turned down a little below the normal intensity. In this way a strong, vigorous print may be obtained from a negative that would otherwise be too thin and flat. Strong, intense negatives are best printed by daylight.

DEVELOPMENT.—Same as enlarged prints.

HINTS.

MEALY MOTTLED PRINTS.—Over exposure and short development.

GREENISH TONES are obtained by over-exposure and too much bromide.

FACE OF PERMANENT BROMIDE PAPER can always be distinguished by its curling in. Convex side is always the back.

FIXING.—The operator can tell when a bromide print is fixed by looking through it or upon it in a good light; unfixed portions will be a greenish yellow.

YELLOW PRINTS.—Prolonged development will cause yellow prints. The exposure must be correct so as to allow of quick development.

FORCING DEVELOPMENT does not give good results for the above reason.

RUNNING WATER is not so sure a means for washing prints as changing them from one tray to another, allowing them to soak at least ten minutes in each fresh water; twelve changes are sufficient; no less.

RETOUCHING NEGATIVES.—Coarse grinding for retouching should be avoided and the retouching “burned in” to the varnish over a spirit lamp to avoid having the scratches show in the enlargement.

DON'T.

DON'T use old hypo for fixing.

DON'T use the developing dish for fixing.

DON'T put the prints between blotters to dry.

DON'T fail to rock the tray well while developing.

DON'T rock in one direction only, unless you want streaky prints.

DON'T fail to lift the print up and turn it over in the clearing solution.

DON'T let a jet of water play on the paper while washing ; it will cause blisters.

DON'T use old developer on large prints for the sake of economy ; use it fresh every time.

DON'T use twice as much acid as directed in the developer or clearing solution ; enough is enough.

DON'T say you can't work Bromide paper because you fail to get a good result the first time. Perseverance in all things.

DON'T expect that the light reflected from a red brick wall will be sufficient for enlarging. Unless your enlarging window has an unbroken horizon use a reflector.

DON'T suppose that a Permanent Bromide print is liable to *fade* because the paper turns yellow. All paper will become yellow after exposure to light and air. For example, see any old engraving or etching. This yellowing or mellowing of the paper has nothing whatever to do with fading.

WHAT PAPER TO USE.

ROYAL BROMIDE PAPER

Is particularly recommended for use where 14 x 17 or larger prints are to be made. When enlarged through bolting cloth and sepia toned, prints on this paper have the breadth and softness of rare old etchings. This paper is not adapted for use when vignettéd prints are wanted, but gives a richness obtainable on no other paper when used with negatives having dark, sketchy backgrounds, deep shadows and snappy high lights. When using bolting cloth screen the time of exposure should be increased about one-third.

STANDARD BROMIDE PAPER

Is a natural surface Bromide paper, which is especially adapted to all kinds of enlargements, particularly copies on which crayon or pastel work is to be done.

The emulsion is coated on three different weights of paper—A, thin smooth—B, heavy smooth—C, heavy rough.

PLATINO-BROMIDE PAPER.

Platino-Bromide is a new argentic bromide paper, giving soft, rich effects, velvety blacks, absolutely pure whites, and having a dead surface like platinum. Unlike platinum paper, however, it will keep before and after exposure, and can be printed by lamplight. Pictures made on it *are permanent* as the paper itself.

ENAMELED BROMIDE PAPER.

Prints on Enameled Bromide paper when untoned combine the soft effects of a platinum or bromide tone with a highly enameled surface. This paper has a slightly pink tint which especially commends itself to those who object to the coldness of an ordinary bromide tone.

Prints on enameled Bromide paper when toned with the hypo toning bath given further on and dried on ferrotype plates are in no wise inferior to the best aristo prints in richness of tone and depth of detail and gloss, hence enlargements made in this way from good negatives are fully equal to contact prints and require no finishing.

MATTE ENAMEL BROMIDE PAPER.

This paper combines the brilliancy of an enameled paper with rich carbon blacks. Like the enameled, it is lent warmth by its slightly pink tint and is capable of taking a beautiful sepia tone.

TWO GRADES—HARD AND SOFT.

The Bromide papers, except Royal, are made in two grades, "Hard" and "Soft." The "Hard" paper is especially adapted to use with sunlight, and should therefore be used for enlarging while the "soft" paper should be used for contact printing, as it is especially adapted to work with artificial light.

SEPIA TONES.

WITH ROYAL BROMIDE, ENAMELED, MATTE-ENAMEL, OR PLATINO BROMIDE PAPER.

By using the following formula rich brown and sepia tones can be readily obtained with prints on *Royal, Enameled, Matte-Enamel or Platino Bromide paper after they have been developed and fixed. The tones produced are believed to be permanent and not subject to the bronzing in the shadows which occur in bromides toned in Uranium.

FORMULA.

Hyposulphite of Soda,	-	-	-	-	20 oz.
Ground Alum,	-	-	-	-	4 oz.
Hot Water,	-	-	-	-	2 gal.

*Where warm sepia tones are desired the Royal paper gives best results if slightly over-exposed and under-developed.

Dissolve the Hypo in the water first, then add the alum slowly; when all is dissolved the solution should be milk white. Allow it to settle, then decant the clear solution and use cold.

TO TONE.

After prints are developed and fixed wash in three or four changes of water and then immerse in the cold toning bath, being careful to remove all air bells. The print or prints should be handled over occasionally during the first four or five hours and may then be left in the bath over night or until the desired tone is acquired.

After toning wash thoroughly two hours and hang up to dry.

DETAILS.

Be sure and fix thoroughly before toning.

Prints should be toned face up.

Solution may be used repeatedly by adding fresh bath occasionally.

A number of prints can be toned in the same bath at the same time.

Spots or unevenness in the tone will disappear if print is left in the bath and occasionally moved.

The toning takes from 15 to 20 hours.

GLOSSY PRINTS WITHOUT A BURNISHER.

Beautiful glossy prints may be made on Enameled Bromide paper by following directions given for using Ferrotypes plates with Solio paper on page 60.

ANOTHER METHOD.

A fine gloss may be given Enameled Bromide Prints by coating the mounted print with a solution of gum arabic, 1 oz., water 4 ozs.; filter through chamois skin each time before using. Apply smoothly with a camel's hair brush. If too thick to spread smoothly, thin with water to proper consistency.

CLEANING THE PRINTS.

The surface of Enameled Bromide Paper is extremely delicate and liable to abrasion which shows in hair-like lines like pencil marks after development. Fortunately they can be easily removed from the *dry print* before mounting by rubbing with a tuft of wet cotton.

MAKING LANTERN SLIDES.

There is no pleasanter part of the art photographic than the making of lantern slides. Permanent Bromide lantern slide plates are coated with an emulsion similar to that used on Bromide paper and are developed in exactly the same manner. Lantern slides can be made by contact printing from $3\frac{1}{4} \times 4\frac{1}{4}$ or smaller negatives and from 4×5 negatives except when it is necessary to retain everything shown clear up to the edges of the original negative. From larger negatives the lantern slides are made by reduction, a process similar to that of enlarging except that the bromide slide plate must be nearer the lens than the negative—the reverse of the enlarging process where the further from the lens the paper is the greater the enlargement. By either the contact or enlarging process the operation of slide making is very simple. If the operator is provided with a developing and printing outfit the only extras required for contact printing will be

- 1 doz. Permanent Bromide Transparency Plates.
- 1 doz. Cover Glasses with Masks.

TO PREPARE THE NEGATIVES.

Take a negative and fasten it in position over the paper mask by means of a bit of gummed paper, and lay the mask with the negative on the clean glass plate in the printing frame with the *negative* between the mask and the glass. Lay one of the plates coated side down, on the negative in the frame, fasten the back of frame and expose the same as described for bromide paper on page 104.

DEVELOPING THE SLIDE.

Take the plate out of the frame and lay it on one of the trays, and cover it with either of the developers recommended for bromide paper on pages 98 to 104.

The image will appear in a few seconds. The development should be continued until the black parts begin to get opaque by transmitted light, or about one to two minutes, then the developer should be poured off and the plate flooded with clean, cold water. After rinsing it three or four times it should be put into another tray and covered with the

FIXING BATH.

Hypo-sulphite Soda,	- - - - -	4 ozs.
Water,	- - - - -	16 ozs.

This should be allowed to act for five minutes, or until the plate is clear and free from milkiness. Then the plate should be soaked in four changes clean water for twenty minutes and stood upon edge to dry, when it will be ready for mounting.

NOTES.—The only experience needed to make good lantern slides by this process is to learn just how long to expose in the printing frame. Negatives vary somewhat in density, and the time given in the directions is for the average density. Thicker negatives require more, and thinner less time. Enough time must be given for the light to strike through all but the densest parts of the negatives. A few trials with a good slide for a guide will enable the learner to judge correctly what time to give the different negatives. The developer should be used fresh mixed for each slide. Enough of the fixing bath should be used to fill the tray half full; it should be thrown away at the end of the evening's operations.

MOUNTING THE SLIDE.

When dry lay the slide face down on one of the prepared covers having the mask on it so as to have it come between the glasses. Then moisten the gummed edges and fold them over the slide.

PREPARED COVER GLASSES.

Eastman's prepared cover glasses have mats and gummed binders attached and will be found a great convenience.

TRIM, TRIM, TRIM.

Trim your prints mercilessly. It is safe to say that three pictures out of every four can be improved by a judicious use of the shears. One picture has too much sky, another too much foreground and another one a whole side with nothing in it worth keeping. When a portion of a picture has nothing in it that is interesting or necessary to the balance of the picture—cut it out.



FIG. I.

Note, if you please, the improvement made by cutting off the foreground in the accompanying illustration. Left untrimmed, as in Fig. 1, the picture has little to recommend it, but with a snip of the shears we have cut out the flat and uninteresting foreground and have secured a picture of far more than the usual interest and beauty (Fig. 2). Take two cards and experiment with your photographs if you have not the heart to attack them with the

shears, laying the cards on them in such a way as to cut out from view what seem to be undesirable parts. An experiment of this kind will soon satisfy you that the shears can be used to advantage.



FIG. II.

HELPFUL HINTS.

Don't use your hypo tray for anything but hypo.

Look on your ground glass, not through it.

Keep films, plates and paper in a cool, dry place.

Label your chemical bottles and keep them well stoppered.

Always dust out your plate holders and dust plates well before loading. A speck of dirt on the plate will leave a transparent spot which will in turn leave a black spot on the print.

Film cartridges are dirt as well as light proof and so the film requires no dusting. Dust will, however, sometimes settle on the sections of film in place in the focal plane inside the camera if a long time elapses between winding the film into position and making the exposure. A famous lecturer and photographer overcomes this difficulty when cycling over very dusty roads by not turning the key until he sees a picture that he wants to take—a very good idea *provided you don't forget to turn the key.*

HINTS.

Dust on the film *after* exposure does little harm as it cuts off no light.

When in doubt, over-expose. It is easier to restrain than to force development.

Do not develop in warm water as it is likely to cause frilling. The developer should be about 60° Fahr.

A Saturated Solution is one in which the liquid has taken up all of the solid which it will.

USEFUL TABLES.

AVOIRDUPOIS WEIGHT.

27.34 Grains=1 Dram=27.34 Grains.
16 Drams=1 Ounce=437.5 Grains.
16 Ounces=1 pound=7000 Grains.

LIQUID MEASURE.

60 Minims=1 Dram.
8 Drams=1 ounce.
16 Ounces=1 pint.

In purchasing or weighing chemicals it is always safe to use grains as the standard of weight, as they are alike in Avoirdupois, Troy and Apothecaries' tables, while the other terms vary.

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In the rendering of cloud effects, true color values, in giving strong contrasts without harshness, and detail without flatness our films are unexcelled, while on account of the thin support and black paper backing giving no reflection, film negatives show far less halation than glass plates.

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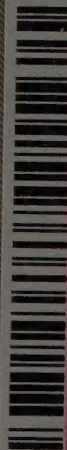
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